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This story won the first prize of $200

It Pays to Replace

BY RUSSELL C. LEGO
Foreman of Machine Shop, The Keystone Driller Co.
Beaver Falls, Pa.

The prizes were offered for the best examples of how a shop saved by replacing old equipment with new equipment. The contest closed July 5

THE following account relates some of the outstanding time- and money-saving experiences that I have encountered during the past several years. The savings that I tell about are being realized every day in the machine shop of which I am foreman.

We thought we were doing fine by turning out three per day of the pulleys shown in Fig. 1 on an old 48-in. engine lathe. But we needed more pulleys and installed a new, up-to-date Niles vertical boring mill on which we get 10 per day.

One in 14 hr. was the rate of production on the steel worm, Fig. 2, when it was made on an engine lathe. Conditions demanding greater output, we put in a Lees-Bradner No. 3 thread miller, with the result that our time on cutting these worms is now 2½ hr. each. With the same machine, production on a smaller worm was increased from 1 in 4 hr. on the engine lathe to 1 per hr. The machine is being operated in conjunction with two others by one man, so beside cutting the machine time, the labor cost is very low.

The pinion and shaft shown in Fig. 3 formerly were in one piece, with cast teeth. The pinion had to be trued and the ends of the shaft had to be turned. The operation was very slow, but we knew no better way, until we installed a 2¾-in. Cleveland automatic and made the part in two pieces.

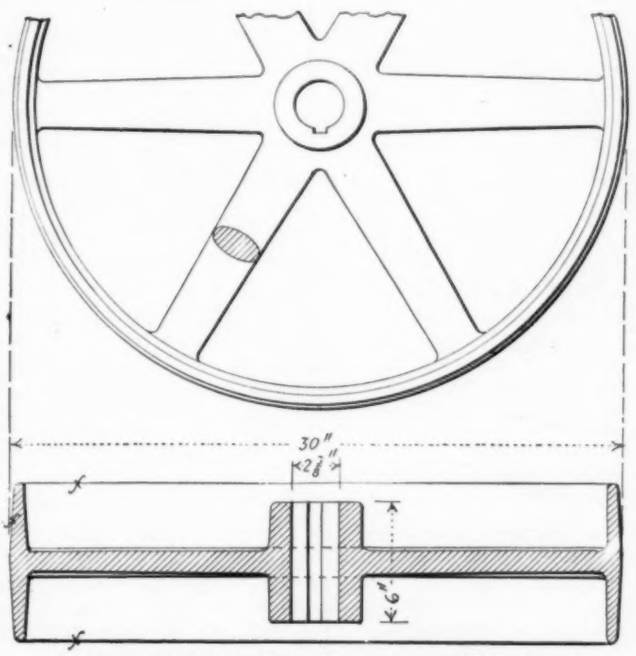


FIG. 1—PULLEY ON WHICH PRODUCTION WAS INCREASED FROM 3 TO 10 PER DAY

The Cleveland automatic gave us plenty of shafts and a turret lathe turned out plenty of pinion blanks, but then we discovered that our old milling machine was not able to turn out enough cut pinions. We installed a No. 4 Milwaukee miller and ended our trouble. The Milwaukee, used with Union cutters, gives us 120 cut pinions per day. By the addition of the Cleveland automatic and the Milwaukee miller we get a cut pinion finished all over at a cost lower than that of the cast pinion with the turned ends. The Milwaukee takes four Union cutters through four rows of pinions at a table feed of 5 in. per min. The limit on the old miller was 2 in. per min. On another pinion we have had a similar experience, increasing the table feed from 1¼ in. to 3 in. per minute.

In the case of the steel casting, shown in Fig. 4, finished where marked, the milling time was reduced on the Milwaukee, with vertical attachment, to 20 min., just about one-half the time required on the old machine. The cast-steel gear, Fig. 9, is milled on the same machine, in about one-half the time required on the old miller which it replaced. This gear is in two parts, and the joining faces of the halves are milled. In fact the Milwaukee miller and Union cutters make a time- and money-saving combination which it is a pretty hard job to beat.

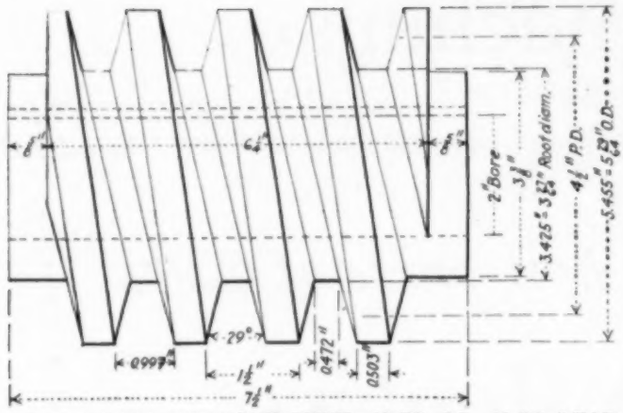


FIG. 2—WORM, WROUGHT STEEL, 1½-IN. C.P., 1½-IN. LEAD, R.H. PRODUCTION INCREASED FROM 1 IN 14 HR. TO 1 IN 2¼ HR.

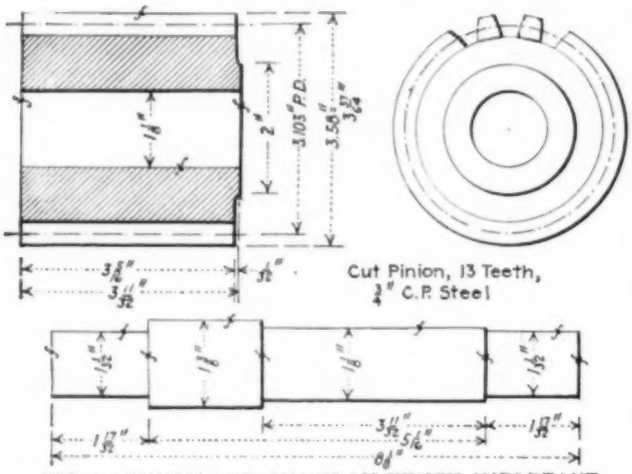


FIG. 3—PINION AND SHAFT ON WHICH IMPORTANT SAVINGS WERE MADE

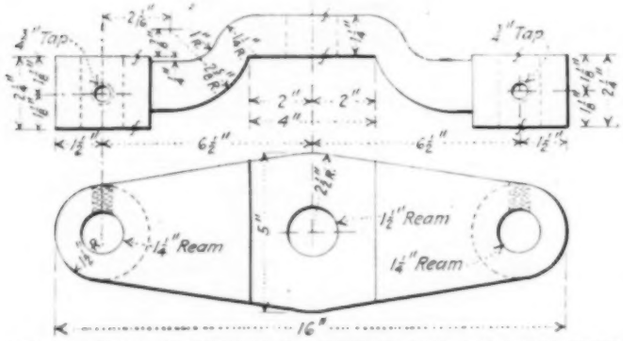


FIG. 4—STEEL CASTINGS ON WHICH THE MILLING TIME WAS CUT ON-HALF

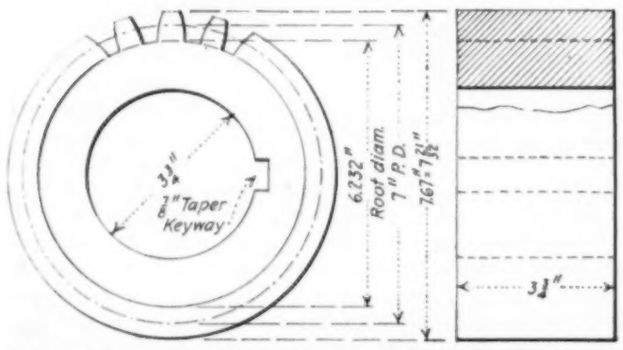


FIG. 5—GEAR, THE BLANK OF WHICH IS MADE FROM THE SOLID FORGING ON A LIBBY LATHE IN 50 MIN.

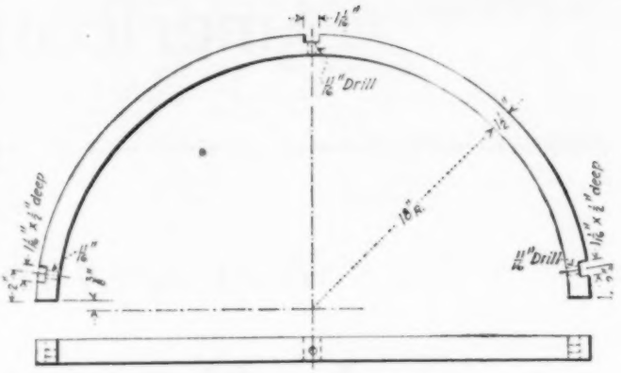


FIG. 6—NOTCHING JOB, DONE ON MILLING MACHINE USING VERTICAL FEED. TIME SAVED, ONE-HALF

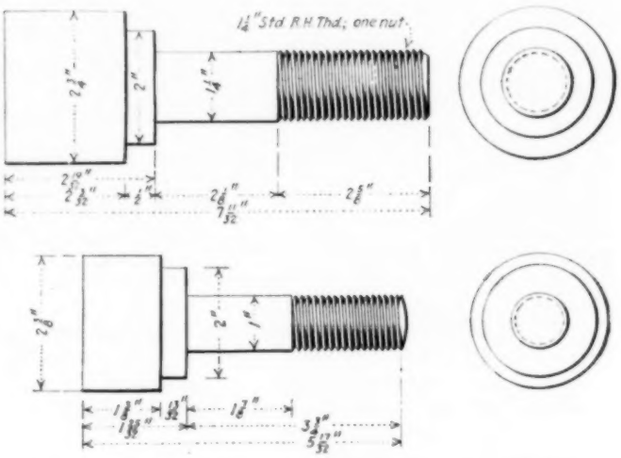


FIG. 7—PARTS MADE ON CLEVELAND AUTOMATIC

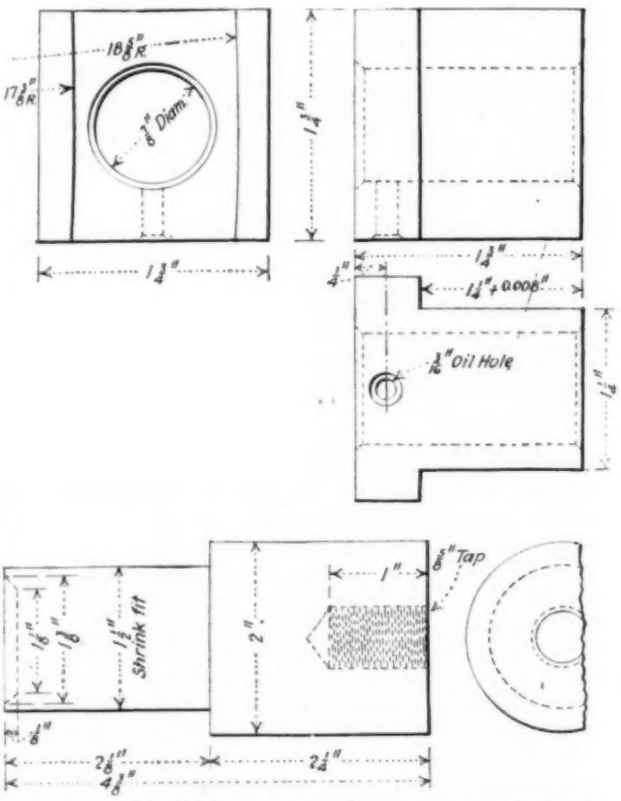


FIG. 8—PARTS MADE ON CLEVELAND AUTOMATIC

The notching job, Fig. 6, is another piece of work done on the Milwaukee. The rate of output is from 75 to 80 per day, a big increase over production on the old machine. The vertical feed of the table is 5 in. per minute.

The parts shown in Fig. 7 were formerly produced on an engine lathe, but a Libby lathe was bought for the job, and it did so well that we have since added ten more Libbys in our different shops. But even the Libby could not keep us supplied, so the Cleveland automatic was put on the job and the result has been at least one-third more production.

The same story is true of the pieces shown in Fig. 8. They were taken from the engine lathe to the Libby and then to the Cleveland automatic. We have recently added two more Clevelands, which are saving time and money every day. The labor cost is very low, as one man operates the three machines.

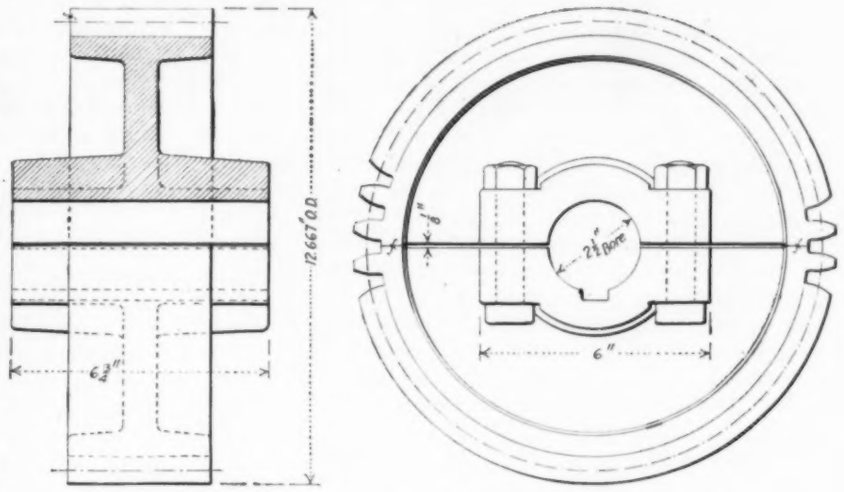


FIG. 9—CAST-STEEL GEAR. MILLING TIME REDUCED ONE-HALF

The blank of the gear shown in Fig. 5 is finished from the solid forging on the Libby lathe in 50 min. This lathe is a great time- and money-saver for us in all of our shops.

We have also installed a Lapointe Machine Tool Co. No. 4 broaching machine on which we finish our bronze bushings with very good results, both in quantity and quality. Our latest additions consist of four Lodge & Shipley engine lathes, three Colburn 48-in. vertical mills, one Milwaukee No. 4 miller, two more Cleveland automatics, one Gray 36-in. planer, one Cincinnati-Bickford radial drill, and one Newark gear hobber. All of these machines are saving time and cutting costs for us every day on their particular lines of work.

As miscellaneous equipment, we have installed a Davis-Bournonville cutting and welding outfit which is a wonderful time-saver for us in cutting structural steel for our finished product; Shepard electric hoists, which greatly facilitate handling work in the shop; and last, but not least, two Elwell-Parker electric trucks which deliver materials from one department to another. The cost of trucking is cut practically in half by their use. Materials handling equipment of today makes big savings and its importance should not be overlooked.

Why the Expert?

By D. C. Wright

A SHORT time ago on a beautiful morning in May, the manager of one of our well-known manufacturing organizations got up from his breakfast, kissed his wife good-by, waved to the children and set out on the brief walk to the plant, filled with a spirit of peace with all of the world. He had put in long hours the day before, and in fact for several days, working out a solution to a problem, which for a time had seemed to threaten the operation of his factory, throw a number of men out of work and generally demoralize production at a time when every pound and unit of output were needed.

He had gone to bed the night before with that feeling of serenity, which can come only after a successful battle fought and won, and he cheerfully looked forward this morning to a day of useful application to some of the pet improvements and policies, which had for long been awaiting the opportunity for serious consideration.

However, his period of self-congratulation was destined to be short, for he had scarcely topped the threshold of his office when he was met by the superintendent of the plant, unctuously conscious of the fact that he was possessed of a fresh batch of bad news, and who without delay set forth to unfold it in all of its lurid horrors.

To make a long story short, the engineer had hardly turned steam into his main equipment that morning before he had noted that there was a decided weave to a portion of one of the machines, where most decidedly no weave was to be expected, and least of all to be desired, and that also there was a bad leak through a portion of the main casting where it was beyond the ability of his experience to figure out the reason.

Being a first-rate engineer, one who was not only keenly alive to his responsibility, but also wise enough to recognize his own limitations, he had promptly shut down and summoned the superintendent.

Superintendent, then Manager, Arrive

The latter had hurriedly arrived upon the scene, since every moment of idleness in this particular piece of equipment meant idleness for a considerable portion of the plant's personnel, to say nothing of the resulting loss in cold dollars and cents for the company; but, like the engineer, he also had to frankly confess that he was "stumped," and a hasty search of the record and files in the engineering department failed to reveal any drawing or diagram that could shed any light upon the internal structure of the particular mechanism which was causing all of the trouble, and which might have enabled any of the high-grade mechanics of the organization to intelligently diagnose the ailment. It was at this point that the manager put in his appearance, and became at once the court of appeal in the case.

Hastily summing up the result of the combined investigations, which had so far been made, the manager hustled to a telephone and got the main office of the

company manufacturing the troublesome machine on the wire, explained the apparent difficulty, set forth all of the symptoms and asked for help, either in the form of advice or direct assistance.

The man at the other end of the wire some hundreds of miles away was very optimistic and stated that fortunately for all concerned one of the company's best expert service men was even at that moment engaged on a job in Blankburg only a few miles from the scene of trouble, and if the manager would simply call a given address by phone, their Mr. So and So would be able to get immediately on the job, and would probably be able to get the job straightened away without delay.

Heaving a sigh of relief, the manager immediately called the address given, and sure enough Mr. So and So was there and would drop everything and come to the scene of trouble upon the next interurban trolley which would get him to the shop in about two hours.

So the men were distributed to other temporary tasks, and everyone set themselves to await with what patience they could the arrival of Mr. Expert, who was to be the prophet to lead them from the land of bondage.

The "Expert" Arrives

Promptly at 1 o'clock a dapper young man with the neatest of neat suits and the fairest of fair complexions walked up to the superintendent outside of the shop and presented himself as the service man of the equipment company.

The superintendent, being a battle-scarred veteran of the wars of shop and foundry, didn't quite kiss the newcomer, but he gave him as warm a reception as his nature permitted and led him without delay into the engine room.

Here, carefully removing his outer wraps and gingerly holding the extension light, which a thoughtful member of the test block gang handed him, the sartorial creation approached the machine and peered long and earnestly at the nickel-plated nuts and piping which extended in the neighborhood of the seat of trouble.

After a few minutes of this sort of thing, the foreman of the job commenced to ply the visitor with hypothetical questions based upon possibilities as he saw them, until, not receiving any very definite answer to any of his queries, he flatly demanded that the newcomer outline an opinion and a course of treatment.

To give the young man credit, he frankly capitulated, and openly proclaimed that he was entirely ignorant of the design, construction or operating principal of the particular type of machine under discussion; volunteered to pitch in and help the mechanics in the shop to find the trouble; or to call up his office at his own expense in order to get expert advise on the subject.

So, reconciled to a further delay, and inwardly cussing a sales promotion policy that would send out cub service men, fresh from school, to monkey with the equipment, which meant the heart and life blood of the plant wherein it might be installed, the manager took the man to his office and arranged to put his call in to the home office.

After the "expert" had made his report to headquarters, the manager himself then took the phone, asked for and got the ear of a veteran engineer in the home office organization, explained in detail the outward signs of trouble, and in a few minutes was equipped with a fair enough understanding of the internal construction of the machine to enable a fair deduction to be arrived at and a course of repair outlined. The engineer at the other end for his part undertook to get a set of detail drawings in special delivery mail, so that they would be in the manager's hands by morning, and volunteered to catch a train and get on the job himself.

Service and Customer Protection Essential

Now the product in question is an internationally known one, familiar to everyone in the power game, and generally considered as a standard. And yet, used as it is in a place, where its continued ability to give service is as essential to the operation of the plant as the drive power on the production machines, the matter of maintaining service and keeping the plants of its users protected against actual shut-down, is entrusted to the tender ministrations of a number of so-called "service men," who have had but a hasty visit to the home plant after completing their schooling in some technical college to acquaint them with the rudiments of the product, and bear no more resemblance to the dyed-in-the-wool "trouble-shooting" mechanic, than the writer's dingy old hat bears to the crown of England.

This is by no means an exaggerated case, but has been carried through in narrative form from start to finish just as an example of dozens of others, with which the writer has come into contact during a strenuous life spent in trying to get out production in the face of every sort of ailment to which the realm of shop equipment is heir.

To be perfectly fair, there have been a number of cases, whose handling as a service proposition has served almost to convert a heart-breaking emergency into a source of pleasure. Real honest-to-goodness experts with grease in their hair, who had come out of the university of the bench and assembly floor only to don the overalls and jumper of the "outside" trouble shooter. These had taken hold of the wabbly or asthmatic machine, engine, motor or compressor, and delving unafraid into its "innards" have ultimately converted the sick child of metal into a husky, willing and useful mechanism, capable of performing its full duty with a promptness and thoroughness that would have done credit to a new machine.

Only why in the name of the gods who watch over sales and advertising, will a lot of real manufacturers of high-grade equipment give of their very best to turn out a good, honest product and then jeopardize the reputation of that product in the field by permitting their cub salesmen and engineers to get their training at the expense of the buyer at the time of all times, when such education is going to cost him dearest in the matter of lost production and idle men?

Would it not be better to pick all service men from an augmented assembly force; or, at the very least, if the organization is not large enough to warrant such an oversize force in this operation, at least insist that each neophyte sales engineer don overalls and for a period perform the tasks within the shop, which will insure his coming into active and intimate personal contact with every portion of the design, construction and operation of the machines in the line, that will be necessary knowledge in intelligently diagnosing the troubles, when that machine gets to be a "key" portion of some plant's operating equipment?

Like Hashimuro Togo, of inquiring mind, "I ask to know."

The New Screw Thread Standard—I

By RALPH E. FLANDERS
General Manager, Jones & Lamson Machine Co.

History of National Screw Thread Commission and A.E.S.C. Sectional Committee—Terminology and definitions from A.E.S.C. report — Explanation of the various terms used

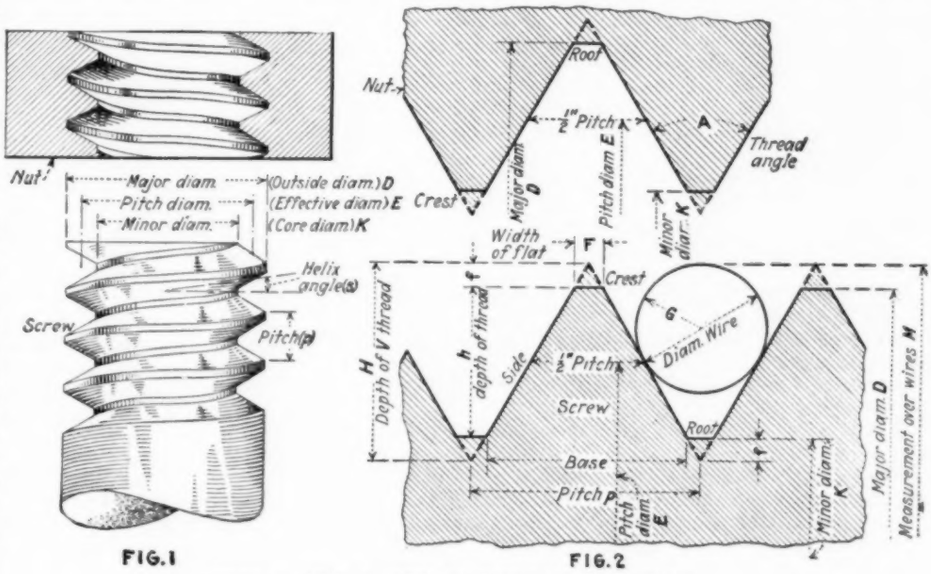
THE SCREW Thread Standard Report has just been made public in its revised form by the American Engineering Standards Committee appointed to review it. It is in many respects the most important piece of standardization work that has yet been undertaken, at least from the standpoint of the machine shop. It has involved the continuous thought of many able men for nearly five years. It has involved inevitable differences of opinion, and long discussion over involved but very important practical considerations. It has finally reached the happy result of having all major differences and most of the minor ones dissolved in mutual agreement by all parties interested. The document is therefore presented to the engineering world as worthy of extended trial and final adoption.

The first or creative part of the work was done by the National Screw Thread Commission, authorized by Act of Congress dated July 18, 1918, and was the outgrowth of difficulties met with in the interchangeable manufacture of munitions of war of all grades. The Chairman of the Commission was Dr. S. W. Stratton, Director of the Bureau of Standards. The result of the work was published in the well known "Progress Report" of Jan. 4, 1921. Much of the material contained therein was at once put to the test of practical application by manufacturing organizations all over the country with excellent results.

In accordance with the object for which it was formed, and at the request of interested individuals and organizations, the American Engineering Standards Committee undertook the examination of this Progress Report to determine its suitability for adoption as an "American Standard." It asked the Society of Automotive Engineers and the American Society of Mechanical Engineers to act as sponsors for this investigation, and on the motion of these two societies a Sectional Committee was formed for this purpose under the chairmanship of Luther D. Burlingame. The object of this body was "to study the Progress Report of the National Screw Thread Commission from the point of view of American industry, to confer with the Commission, and to report to the American Engineering Standards Committee on the several thread standards which this Progress Report contains."

These objects have been accomplished. The report has been condensed to practical proportions for shop use, certain combinations of thread series and fits have been recommended for general practice, and certain changes suggested in the details of the report which have been a matter of conference with the Commission, and on which agreement has been reached.

The remainder of this series of articles consists of a piecemeal presentation of the report with accompanying explanation and interpretation by the writer, who has been a member of the Commission since July, 1920, a member of the A. E. S. C. Sectional Committee since its formation, and a member of the Working Committee to which the Sectional Committee entrusted the detailed examination of the Progress Report. The connection has therefore been an intimate one. Nevertheless it should be clearly understood that the explanation and interpretation here given are purely matters of individual opinion. They are not official in any sense. The only official statements in the case are the two documents: the Progress Report of the Commission, and the Standards Report of the A. E. S. C. Sectional Committee.



FIGS. 1 AND 2—SCREW THREAD NOTATION

The A. E. S. C. report under consideration deals only with "standard screw threads for bolts, machine screws,

nuts, commercial tapped holes, etc." The two fire hose standards were taken care of by another committee, and the pipe thread standard had already been adopted by the A. E. S. C.

Here follows an installment of the text of the report:

I—TERMINOLOGY

1—INTRODUCTION

In this report there are utilized, as far as possible, the non-technical words and terms which best convey to the producer and user of screw threads the information presented.

2—DEFINITIONS

The following definities are given of the more important terms. Definitions of terms which are obviously elementary in character are intentionally omitted.

(a) Words Relating to Screw Threads

1—*Screw Thread*—A ridge of uniform section wound in the form of a helix on the inside or outside surface of a cylinder or cone.

2—*Major Diameter*—The largest diameter of the thread on the screw or nut. The term "major diameter" replaces the term "outside diameter" as applied to the thread of a screw and also the term "full diameter" as applied to the thread of a nut.

3—*Minor Diameter*—The smallest diameter of the thread on the screw or nut. The term "minor diameter" replaces the terms "core diameter" and "root diameter" as applied to the thread of a screw and also the term "inside diameter" as applied to the thread of a nut.

4—*Pitch Diameter*—On a straight screw thread the diameter of an imaginary cylinder which would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cylinder.

5—*Pitch*—The distance from a point on a screw thread to a corresponding point on the next thread measured parallel to the axis.

$$\text{Pitch} = \frac{1}{\text{number of threads per in.}}$$

6—*Lead*—The distance a screw thread advances axially in one turn. On a single-thread screw, the lead and pitch are identical; on a double-thread screw, the lead is twice the pitch; on a triple-thread screw, the lead is three times the pitch, etc.

7—*Angle of Thread*—The angle included between the sides of the thread measured in an axial plane.

8—*Helix Angle*—The angle made by the helix of the thread at the pitch diameter with a plane perpendicular to the axis.

9—*Crest*—The top surface joining the two sides of a thread.

10—*Root*—The bottom surface joining the sides of two adjacent threads.

11—*Side*—The surface of the thread which connects the crest with the root.

12—*Axis of a Screw*—The longitudinal central line through the screw.

13—*Depth of Thread*—The distance between the crest and the root of the thread measured normally to the axis.

14—*Length of Engagement*—The length of contact between two mating parts, measured axially.

15—*Depth of Engagement*—The depth of thread in contact of two mating parts, measured radially.

(b) Words Relating to Classification and Tolerances

1—*Allowance*—The difference in dimensions between the minimum hole and the maximum screw.

2—*Tolerance*—A definite difference in the dimensions of either part, prescribed in order to limit the variations in manufacture permissible for a given class of fit.

3—*Basic*—The theoretical or nominal standard size from which all variations are made.

4—*Finish*—The character of the surface on a screw thread.

5—*Crest Clearance*—Defined on a screw form as the space between the top of a thread and the root of its mating thread.

6—*Fit*—The relation between two mating parts with reference to ease of assembly; for example: Wrench fit; close fit; medium fit; free fit. The quality of fit is dependent upon both the relative size and the quality of finish of the mating parts.

7—*Limits*—The extreme dimensions, which are prescribed to provide for variations in fit and workmanship.

3—SYMBOLS

1—*Dimension Symbols*—For use in formulas for expressing relations of screw threads and for use on drawings and for similar purposes the following dimensional symbols should be used:

Major diameter	D
Corresponding radius	d
Pitch diameter	E
Corresponding radius	e
Minor diameter	K
Corresponding radius	k
Angle of thread	A
One-half angle of thread	a
Number of turns per inch	N
Number of threads per inch	n
Lead	$P = \frac{1}{N}$
Pitch or thread interval	$p = \frac{1}{n}$
Helix angle	s
Tangent of helix angle	$S = \frac{P}{3.14159 \times E}$
Width of basic flat at top, crest or root	F
Depth of basic truncation	f
Depth of sharp V-thread	H
Depth of American (National or U. S.) form of thread	h

2—*Symbols for Wire Measurements*

Measurement over wires	M
Diameter of wire	G
Corresponding radius	g

3—*Identification Symbols*—These are for use on correspondence, drawings, shop and store-room cards, specifications for parts, taps, dies, gages, etc., and on the tools and gages themselves.

The basis of the system is the initial letters of the series, preceded by the diameter in inches (or the screw number) and number of threads per inch, followed by the classification of it, all in Arabic characters. If the thread is left-hand the symbols "L.H." shall follow the number of threads. No symbol is used to distinguish right-hand threads.

Examples	Mark
American National Coarse-Thread System	
To specify a threaded part 1 in. diameter 8 threads per in., Class 2 fit	1"-8-NC-2
American National Fine-Thread System	
Threaded part 1 in. diameter, 14 threads per in., left-hand thread, Class 3 fit	1"-14-LH-NF-3
American National Form, Special Pitch	
Threaded part 1 in. diameter, 12 threads per in., Class 4 fit	1"-12-N-4

4—ILLUSTRATIONS SHOWING TERMINOLOGY

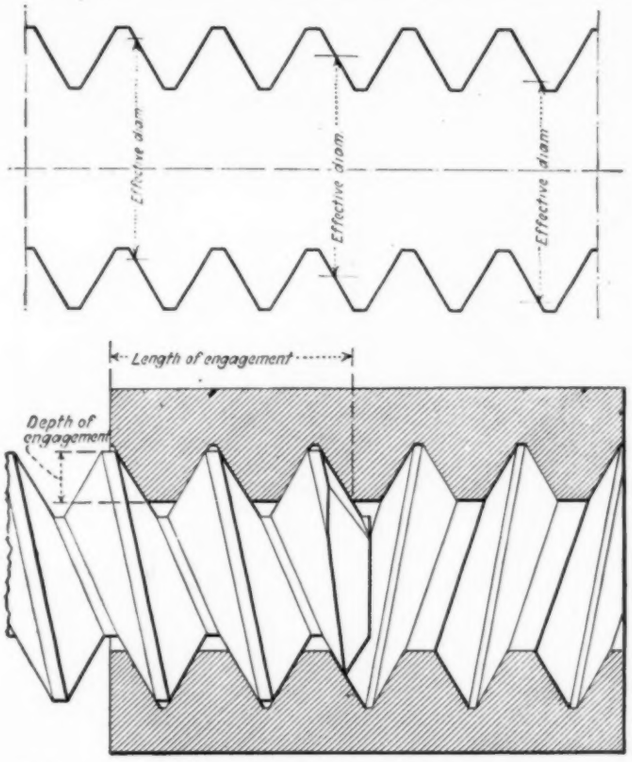
Figs. 1 and 2 illustrate the application of the terms used in this report as previously defined.

This first section relating to definitions will at first glance appear unimportant, but nothing could be further from the fact. The practical mechanic is urged to read it with great care, and to accustom himself to use the terms here given, with the meanings here applied to them. Any one who has been connected with the manufacture or sale of threading tools, gages, etc., as well as threaded products, knows the great waste of energy, time and money that results from the prevalent carelessness in the use of screw thread terms. It is

most important that these terms be standardized and strictly adhered to by all parties concerned.

A number of novelties will be noted at once, particularly the terms "major diameter" and "minor diameter." The great advantage of these expressions is that they cannot be mistaken, and that they are equally plain whether applied to the screw or the tapped hole. As much cannot be said for the terms which they displace. For instance "outside diameter" is self-evident as applied to the screw, but unsatisfactory as applied to the nut. The part of the thread in a nut lying on the *outside* diameter is the part further *inside*, to the view of any one peering into the hole. The same criticism, reversed, applies to the old term "inside diameter," as applied to a nut or tapped hole. "Root diameter" is ambiguous in the case of the tapped hole because the accepted definition of the word "root" as applied to the thread of a nut locates it on the major diameter as shown in Fig. 2 instead of on the minor diameter.

The term "pitch diameter" has been retained as being firmly established and not ambiguous in practice;



FIGS. 3 AND 4—ENGLISH EQUIVALENT OF PITCH DIAMETER AND DIAGRAM SHOWING LENGTH AND DEPTH OF ENGAGEMENT

the corresponding English term is "effective diameter." The English definition reads, "The 'effective diameter' of a screw having a single thread is the length of a line drawn through the axis and at right angles to it, measured between the points where the line cuts the slopes of the thread." The English method of measurement, shown in Fig. 3, amounts to the same thing as our own in the long run.

Two Extremely Important Definitions

There are two of these definitions which should be read and re-read and implicitly followed, those for "Pitch" and "Lead." It is important to emphasize this, because one of the largest manufacturers of screw threading tools has used these terms carelessly in its printed literature, and added confusion where there was plenty already. It will not be easy to change our practice, and give the pitch of a thread as "$\frac{1}{16}$." It will not, in fact, be necessary. "Sixteen threads per inch" is a reasonable answer to the question of "What pitch?", if we remember that the corresponding answer to the question "What lead?" is "16 *turns* per inch." It would, indeed, have been well to add to the definition of "lead" the formula:

$$\text{The lead} = \frac{1}{\text{Number of turns per inch}}$$

to correspond with the formula given for the pitch.

To make sure that the definitions are understood, it should be remembered that a screw having 16 threads per inch, double, has a lead of $\frac{1}{8}$ in.; a screw of 12 threads per inch, triple, has a lead of $\frac{1}{4}$ in.; a screw of 20 threads per inch, single, has a lead of 1/20 in., etc.

In connection with the terms "crest" and "root," it should be carefully noted, as shown in Fig. 2, that the crest of the thread in a nut is located on the minor diameter, while that of a screw is located on the major diameter—and *vice versa* for the root.

Fig. 4 is here provided to illustrate the terms "length of engagement" and "depth of engagement."

Among the terms relating to classification and tolerances, the importance of the definitions for "Allowance" and "Tolerance" should be noted. There is still a tendency to use these terms interchangeably, when in fact they have distinct meanings. If the maximum screw made to given tolerances is basic, and if the minimum tapped hole made to given tolerances is also basic, that tolerance system has a *zero allowance*; if the maximum screw is smaller than basic, and the minimum tapped hole remains basic, there is a *positive allowance* equal to the difference between the two; if the maximum screw is larger than basic and the minimum tapped hole remains basic, there is a *negative allowance* or *interference* equal to the difference between the two.

Dimensional and Identification Symbols

The "dimensional symbols" given are commended to the attention of all writers of articles, preparers of formulas and tables, and authors of text books everywhere. If these are strictly adhered to, the reader of technical literature will learn to attach their proper meanings to them and have his work much simplified in consequence.

The "identification symbols" are of still greater importance. It is confidently believed that the tolerances proposed in this standard (which will be published in later installments of this series) will so commend themselves to practical men that there will be an insistent demand for taps, dies, gages and other stock tools for their cheap and accurate production. When that time comes a uniform method of identifying these tools for the various sizes and fits will be found necessary. Hence the standardization of these symbols. These tools will be satisfactory to the customer who still thinks in terms of "U.S.S." and "S.A.E.," which standards are not thereby superseded but are incorporated instead. An explanatory printed note might well be wrapped about the tool by the manufacturer whenever an "N.C." tap, for instance, is sent to fill a "U.S.S." order, or when an "N.F." gage is sent on an "S.A.E." order.

The next installment will deal with the important question of thread form.

World Trade in Metal Working Machinery—Exports

Prepared by Industrial Machinery Division, Bureau of Foreign and Domestic Commerce

Switzerland, 1922

Now shown as "Werkzeugmaschinen"—Formerly, "Werkzeugmaschinen zur Bearbeitung von Metallen, Holz, Stein, Etc."

Supplement to table published on pages 958-9, Vol. 57.

Country	Quantity q.n.	Value Francs
Germany	1,060	532,000
Austria-Hungary	150	30,000
France	14,803	5,207,000
Italy	444	189,000
Belgium	2,586	699,000
Netherlands	115	52,000
Great Britain	1,188	633,000
Russia	.....	.....
Sweden	811	257,000
Norway	263	185,000
Denmark	.....	.....
Portugal	.....	.....
Spain	388	136,000
Greece	.....	.....
Bulgaria	.....	.....
Roumania	612	278,000
European Turkey	.....	.....
Serbia	.....	.....
Czecho-slovakia	266	200,000
Yugo-slovakia	.....	.....
Egypt	77	24,000
Algeria and Tunis	.....	.....
South Africa	.....	.....
West Africa	.....	.....
East Africa	.....	.....
Other Africa	.....	.....
Asiatic Turkey	.....	.....
British East Indies	.....	.....
French Indo-China	50	19,000
Dutch East Indies	.....	.....
China	64	45,000
Japan	459	317,000
Australia and New Zealand	89	51,000
Philippine Islands	.....	.....
Canada	.....	.....
United States of America	113	104,000
Mexico	.....	.....
Central America	.....	.....
Brazil	65	37,000
Colombia	.....	.....
Argentine	142	67,000
Chile	.....	.....
Other Countries	485	97,000
Total	24,230	9,159,000

Value of franc at parity is 19.30c. q.n. = metric quintals or 100 kilograms = 220.46 lb.

Sweden, 1920

Supplement to table published on pages 876-6, Vol. 57.

Country	Kg.	Kroner
Norway	259,925	1,099,907
Finland	70,134	288,140
Russia in Europe	.....	.....
Denmark	171,709	318,324
Germany	.....	.....
Netherlands	31,976	118,745
Belgium	100,869	318,272
Britain	312,027	939,131
France	164,201	584,545
Spain	419,626	1,505,552
Portugal	71,581	202,265
Italy	.....	.....
Switzerland	.....	.....
Austria	.....	.....
Hungary	.....	.....
Roumania	.....	.....
Bulgaria	.....	.....
Iceland	.....	.....
Egypt	.....	.....
British S. Africa	.....	.....
China	.....	.....
Japan	18,877	64,600
Other Asia	.....	.....
Australia	81,409	252,056
British North America	.....	.....
United States of America	.....	.....
Brazil	11,192	48,277
Argentina	.....	.....
Other Countries	437,276	1,383,825
Br. East Indies	23,779	79,337
Morocco	11,458	42,410
TOTAL	2,186,039	7,245,286

Par value of krona = 26.80 c.

Germany, 1921

Supplement to table published on page 840, Vol. 57.

Country	Quantity 100 kgs.	Value 1000 Marks
Belgium	79,413	
Bulgaria	.....	
Denmark	13,063	
France	79,795	
Greece	.....	
Great Britain	.....	
Italy	52,945	
Netherlands	46,305	
Norway	.....	
Austria-Hungary (Austria only since 1920)	48,015	
Portugal	.....	
Roumania	11,628	
European Russia	.....	
Asiatic Russia	.....	
Finland	.....	
Sweden	12,620	
Switzerland	17,477	
Serbia	.....	
Spain	23,178	
Turkey in Europe	.....	
Turkey in Asia	.....	
Egypt	.....	
British South Africa	.....	
German Southwest Africa	.....	
German East Africa	.....	
Tunis	.....	
British India	.....	
China	.....	
Japan	.....	
Dutch East Indies	.....	
Siam	.....	
Argentina	15,921	
Brazil	12,882	
Canada	.....	
Chile	.....	
Mexico	.....	
Uruguay	.....	
United States of America	.....	
Australia	.....	
Saar Basin	14,805	
Alsace-Lorraine	2,528	
Czcho-slovakia	21,604	
Netherlands E. Indies	7,286	
Other Countries	137,785	
TOTAL	597,250	11,542,627

Total number of pieces 125,963

Japan, 1921

Country	Yen
China	184,000
Kwantung Province	114,000
Hong Kong	66,000
British India	7,000
Straits Settlements	2,000
Great Britain	13,000
Total	386,000

1 yen = 49.85c.

Machining Steel Cylinder Sleeves of the Wright Aviation Engine

BY FRED H. COLVIN
Editor, *American Machinist*

First part of the second article—Turning, boring and threading long, thin sleeves with interlocking flanges — Special tools, fixtures and gages for securing heat radiating contacts

THE cylinder sleeve for the Wright Aeronautical engine is a steel forging which is shown in detail in Fig. 12 and being rough turned in Fig. 13. The forging is first heat treated and then tested for hardness by the Brinell method. The desired hardness is 170, although the tolerance runs up to 190. Sleeves which cannot be brought within this range are held out and run through separately as a single lot. The sleeve is first chucked on the outside diameter and the flange rough faced and turned. Rough boring to 5.442 in. comes next, the tolerance being 0.005 in. The total inside length is 12.143 in. with a plus or minus tolerance of 0.005 inch.

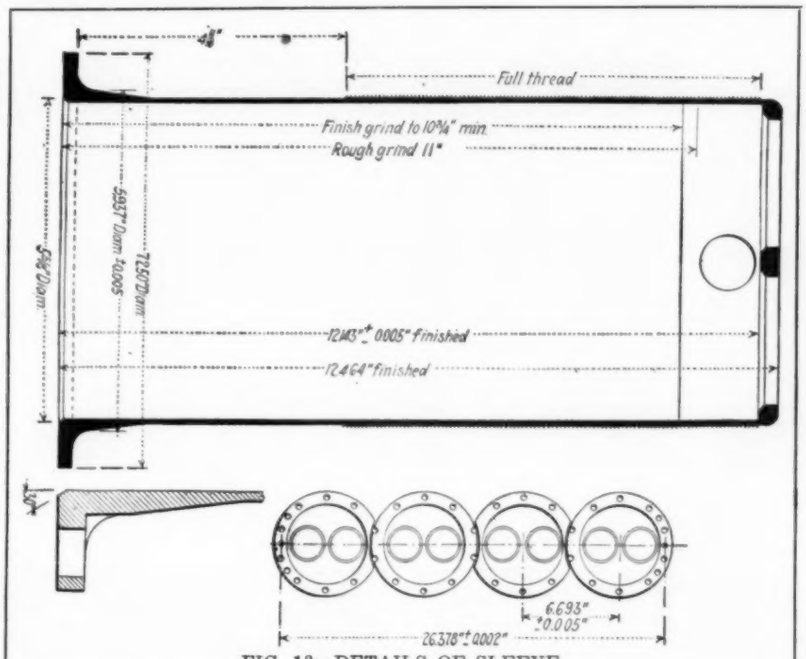


FIG. 12—DETAILS OF SLEEVE

SEQUENCE OF OPERATIONS

Heat treatment	Finish bore	Bore valve seat holes
Brinell test	Finish turn outside	Finish mill top of block
Rough turn flange	Cut thread on outside	Finish grind flange
Rough bore	Grind solid end of sleeve	Lap top of block
Face back of flange	Assemble in block	Grind bore of sleeve
Rough turn outside	Cut segments from flange	Inspection

The sleeve is then held on an expansion arbor, and the back end of the flange at the outer end of the sleeve faced to bring the total length to 12¾ in. The outside diameter is then rough turned to 5.824 in. except for the taper near the flange, as shown in Fig. 12. This leaves the wall approximately 0.19 in. thick for the future operations, which materially reduce this thickness.

The sleeve is then chucked by the outside diameter in special jaws, and the inside finish bored to 5.492 in. the tolerance now being reduced to 0.002 in. The flange is faced and turned and the end of the bore beveled to a 30 deg. angle, as shown in Fig. 12.

Going again to an expansion arbor, the sleeve is held for finish turning on the outside to 5.744 in. with no plus tolerance and a minus tolerance of 0.003 in. The taper at the flange end is now finished and preparations made for starting the thread at the front end.

The sleeve is now thoroughly washed in soda water and the thread cut with a Modern self-opening diehead arranged on a lathe fixture, as shown in Fig. 14. The thread is 146 mm. or 5.748 in. in diameter and 1.5 mm. pitch, or approximately 18 threads per in., of the U. S. form. The thread is approximately 7½ in. long on a wall 0.128 in. thick, while the thickness of the remainder of the sleeve between the threaded portion and the flange is 0.078 in. thick.

The job of thread cutting is an unusually difficult one, both on account of the large diameter of the work and the length of the thread, as well as the necessity of having the thread as smooth as possible so as to make an intimate contact with the cylinder block, in order to secure the maximum transmission of heat. For this reason, it is interesting to examine the method of holding the diehead on the lathe carriage, as it is necessary that it be supported centrally and firmly while cutting the thread.

Ample lubrication is supplied to the chasers through the pipe at the right, the small globe valve controlling

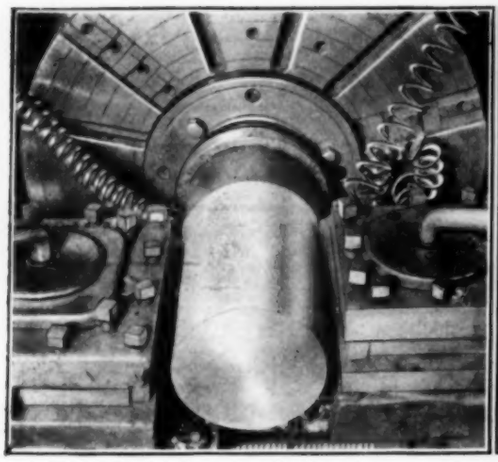
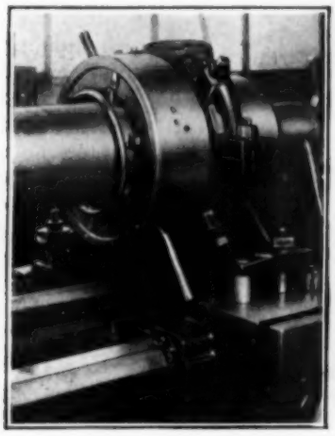
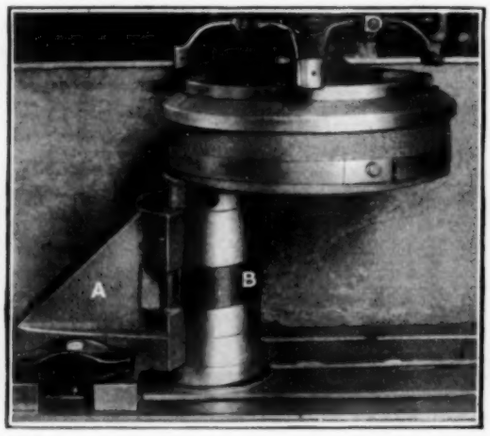


FIG. 13—ROUGH TURNING SLEEVE. FIG 14—CUTTING THREAD ON SLEEVE





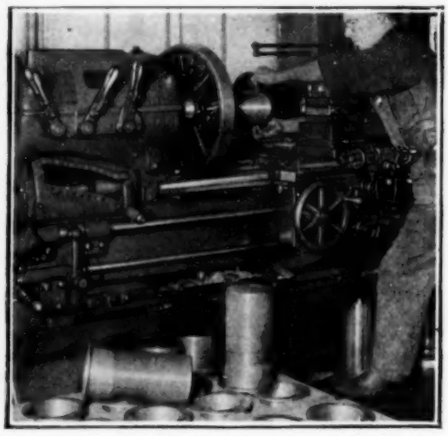
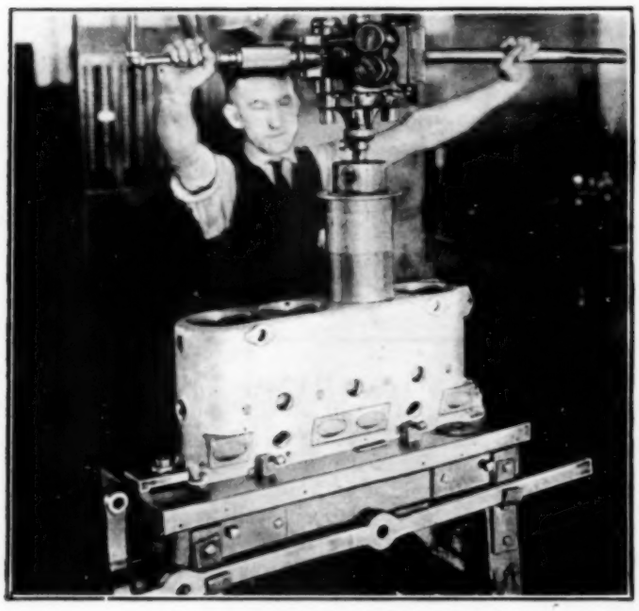


FIG. 15—DETAILS OF DIE AND HOLDER. FIG. 16—GRINDING TOP OF SLEEVE
FIG. 17—FINISH TURNING END OF SLEEVE



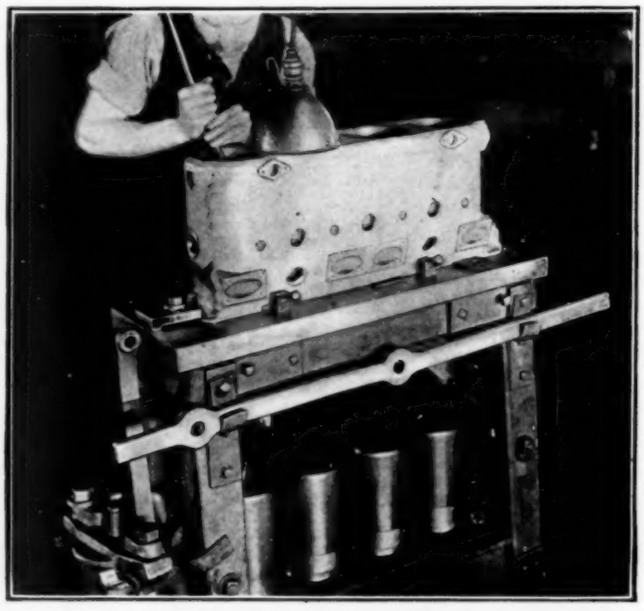


FIG. 18—SCREWING SLEEVE IN BLOCK. FIG. 19—SCRAPING INSIDE SURFACE OF BLOCK

the flow as desired. Each sleeve is inspected as it comes off the lathe, as can be seen at the left, where a thread micrometer is being used to measure the pitch diameter. A ring gage is also used in inspecting the thread. Some idea of the careful way in which the threaded sleeves are handled can be had from noting the rack at the left, on which the sleeve being inspected rests. The box or framework shown protects the whole outside diam-

eter of the sleeves from dirt and injury between operations. Another view of the sleeve being threaded is shown in Fig. 15, which gives a better view of the die and the screws by which it is centered. It also shows the pipe ring which supplies lubrication directly to the chasers as the die advances over the sleeve.

The top of the sleeve is then finish ground on a Pratt & Whitney vertical grinding machine, being held in the fixture shown in Fig. 16. This fixture consists of a substantial angle casting *A*, bored to fit the outside of the sleeve and having a sheet metal band *B* by which the sleeve is held firmly against the casting. A suitable height gage is used for inspection.

The sleeve then goes to the Lodge & Shipley lathe shown in Fig. 17, where the front end is turned to a diameter of 5.665 in. and the end finished to a ⅛-in. radius, as it is very important that perfect contact be secured between the end of the cylinder sleeve and the head of the cylinder casting, in order to secure the greatest possible radiation of the heat. The end or face of the sleeve is then polished with a parallel bar covered with No. 0 abrasive cloth lubricated with oil. After a thorough inspection, the sleeves are delivered to finished stock. Assembling of the sleeves to the cylinder block now begins, to form a single unit.

Having completed both the cylinder blocks and the sleeves to the point of putting them together for future operation, it will be well to refer to Fig. 12 and note the way in which they fit together, as shown at the right. It will be seen that the flanges of Nos. 1 and 3 sleeves remain intact, but that both sides of sleeve No. 2 and one side of sleeve No. 4 are cut away to allow sleeves Nos. 1 and 3 to be screwed into place. Before this is done, however, each sleeve is screwed in, and taken out as in Fig. 18, both to be sure of the fit of the thread and also of the end of the sleeve against the crown of the cylinder block. The method of screwing the sleeves in place by means of the air motor is clearly shown as well as the method of holding the cylinder block in position on the assembly table.

After removing the cylinder sleeve, the bearing on the end is carefully inspected and any high spots on the crown of the cylinder bore are removed by scraping, as shown in Fig. 19. The location of the segments which are to be cut from the flanges of sleeves Nos. 2 and 4 is also determined after these two sleeves have been finally bedded into their positions in the cylinder block. In all future assembling, sleeves Nos. 2 and 4 must be screwed into place before Nos. 1 and 3, the reverse being necessary in removing them for any cause.

Endurance of Properties of Steel

One of the papers presented at the 26th annual meeting of the American Society for Testing Materials, held at Atlantic City, June 25 to 29, 1923, was by D. J. McAdam, Jr. on the endurance properties of steel. This paper gives the results of endurance tests at the U. S. Naval Engineering Experiment Station, on carbon and alloy steels. Static tension, torsion and impact tests were made on these types of steel. Rotating-cantilever and alternating-torsion tests were made on specimens of various forms having various types of surface finish.

Repeated impact tests were made on a special machine and as a result, the relationship of repeated impact to single impact and to endurance properties was shown.

In discussing the results of the tests, the following subjects were given consideration: Relationship of endurance properties to static tension and torsion properties; relationship of endurance properties to impact properties; influence of chemical composition and heat treatment; influence of non-metallic inclusions; influence of form and surface finish of a machinery part, and types of steel best adapted for various kinds of service.

This endurance value of steel is of particular moment to machine designers and the following extracts from the paper should prove of value to them.

When a machinery part subject to repeated or alternating stress is to be made as light as possible, the proper design of the part involves not only intelligent attention to form and dimensions but also intelligent selection of material. In the proper selection of material, use can be made of the information presented, in regard to the relationship of endurance limit to other physical properties.

For fatigue resistance, the endurance limit should be made as high as possible. This involves making the tensile strength as high as is possible consistent with the use to which the material is to be put. Too much stress has in many cases been laid on ductility. In many machinery parts, in which an "elongation" of 16 per cent would be ample, it has frequently been the practice to aim at an elongation of 30 or 35 per cent so as to get material with high Charpy value supposedly indicating "shock-resistance" qualities. For machinery parts such as bolts, which even though threaded should be able to withstand slight deformation without fracture, ductility is of much importance and the Charpy test is of some value. To minimize the disastrous effects of collisions or other accidents, it may be desirable that certain machinery parts have enough ductility to bend somewhat without fracture. Even in such parts, however, the quality of first importance is resistance to fatigue failure, which is always a fracture in which the most ductile material behaves as if it were brittle. The value of quenching and tempering in raising not only the tensile strength but the endurance ratio has already been emphasized. The higher combination of "endurance ratio" with ductility obtainable with alloy steels justifies their use in machinery in which a high endurance limit is of importance.

When a forging cannot be quenched and tempered or when the effect of heat treatment is greatly limited, as in the case of large forgings, chemical composition becomes of even greater importance. The effect of an alloying constituent such as nickel in raising the endurance ratio is worthy of consideration. The use of higher carbon percentages in large forgings in order to raise the tensile strength at the expense of the frequently excessive ductility would in many cases give material more suitable for its purpose.

When the stresses in service are to be repeated rather than alternating it is desirable, in order to secure the necessary high elastic ratio, that quenched-and-tempered steel be used. For the same reason, as well as on account of its high endurance ratio, the use of alloy steel is especially desirable. For large forgings or whenever an effective quenching treatment cannot be given, nickel steel, for the same reason, is especially useful.

There is no doubt that the information obtained within the last few years on the endurance properties of steel will lead to many changes in selection of material on the principles above outlined.

Book Reviews

The Blast Furnace and the Manufacture of Pig Iron. Third edition, by Robert Forsythe, revised by Carl A. Meissner and J. A. Mohr. Cloth boards, 377 pages, 6x9 in., and 74 illustrations. Published by the United Publishers Corp., 239 West 39th St., New York, N. Y. Price $4.

This volume is not offered as an exhaustive treatment of the subject, but is designed primarily for the use of metallurgical students, foundrymen and blast furnace operators as a guide in grasping the general fundamental principle of blast furnace practice. The most recent and most practical information on this subject is given in such a clear and concise manner that every detail should be quickly mastered.

In addition to the main text on blast furnace practice, a supplement has been added that is devoted entirely to the manufacture of pig iron. Furthermore, a brief review of the principles of chemistry and physics is included, which is intended for non-technical readers.

All the materials that make up the charge of the blast furnace, namely, ores, fuels and fluxes are discussed in detail in the main text. The various iron ores available, their place of occurrence and the methods of preparing them for charging, calcination, roasting, concentration and agglomeration, are given. Then the three types of fuels, charcoal, raw coal and coke are taken up, showing how they are obtained and their relative values. And lastly the various fluxes are described with the purpose of relating how their use facilitates the flow of the metal and cleans out impurities.

With the materials going into the manufacture of pig iron described, the text then goes into a detailed study of the plant layout such as furnace design and equipment, the operation, burdening and action within the furnace, and furnace irregularities. It shows the general methods of constructing the various parts of the furnace such as bosh walls and plates, inwalls, lining, tapping and cinder holes, tuyeres and the top arrangement, gives the types of stoves needed to heat the blast and the other equipment essential in blast furnace operation such as pyrometers for measuring temperature, cast houses, boiler and blowing plants.

Then the operation of the furnace from the time of charging till the metal is poured into pig-beds or ladles and the methods by which the furnace temperature and slag composition are controlled, are described in detail. In addition, the problem of burdening the furnace is presented in two distinct phases, namely the theoretical, when dealing with new problems such as unfamiliar materials or when using familiar materials in unfamiliar proportions, and the empirical phase, when a furnace is operating with fixed sources of supply. And lastly, the action within the furnace due to the descending current of solids and the ascending current of gases is explained together with the forms of irregularities likely to occur due to a variety of causes such as leaky tuyeres, destruction of lining, obstructions and a chilled hearth.

The supplementary chapter on pig iron manufacture gives the classification of pig irons and the methods of converting pig iron into wrought iron and steel.

Among the subjects analyzed in the last chapter, which is devoted to some principles of chemistry and physics, are chemical and physical changes in matter, nature of matter, oxidation and reduction, description of the elements entering the furnace, phases and states of matter, laws of gases, heat and fuel. These subjects are reviewed with the purpose of explaining the changes in the composition of the materials that enter the blast furnace.

Applied Personnel Procedure. By Frank E. Weakly. One hundred eighty-seven pages, 5½x8½ in., cloth boards. Published by the McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. Price $2.

Written with a foundation, on the part of the author, of experience in manual work, personnel department and a general executive position, this volume partakes of the case method of presenting certain personnel problems and their solutions. It is not intended as an exhaustive treatise on personnel administration, an advantage in that it gets down at once to definite conclusions and practicalities, that may be applied in organizations of any size.

The first chapter asks and answers the question, "Why a Personnel Department?" The place of human relations in industry is recognized and clearly stated. There follow chapters on sources of help supply; interview, selection and placement; attendance and punctuality; promotions and transfers; job analysis and job specification; employee training plans; employee representation; profit sharing and savings; and other subjects.

A very fair conception of the rights of employer and employee is shown. Mr. Weakly appears to lean niether way, but to have analyzed without prejudice the dependence of the success of any industrial undertaking upon harmonious personnel relations. The reader with an average understanding of the many problems of human relations will find that he can agree with most of the statements in the book and that he has been furnished with a guide for the application of methods that are not complicated.

Engineering Index for 1922. 675 pages, 6½ x 9¼ in. Published by the American Society of Mechanical Engineers, 29 West 39th St., New York City.

This is the fourth volume of the index to be published since it was taken over by the A. S. M. E., and the twenty-first volume since its inception. The Index reviews over 1,300 periodicals, reports and other publications, and the articles selected for extract represent over 600 of these. About 20 per cent of the articles reviewed are printed in Great Britain or her possessions, while 30 per cent are from representative publications in Belgium, France, Germany, Spain, Italy, South America, etc. The remaining 50 per cent are from American publications.

As in any case where extracts are made, there is always the problem of the personal equation in the selection of the article and the extract made from it. Here the editor is the czar, and there is no getting behind his decision. This of course, means that the articles cited by no means represent all that have been published on any given subject, and the reader must be content with such references as, in the judgment of the editor, cover the subject. Such a point is always open to discussion, and the user of any book of this kind must bear in mind that his information on any given subject can usually be largely supplemented by reference to the leading periodicals in his particular field.

Industrial Cost Accounting for Executives

By PAUL M. ATKINS

The eighteenth article—Interest as an element of cost—The fundamental issue—Theoretical and practical problems—The influence of the attitude of the executive

THERE IS probably no subject in the whole cost-accounting field which has been the source of so much controversy as the question of whether or not interest shall be included as an element of cost. While undoubtedly the topic is an important one, the space devoted to its discussion has been all out of proportion to its real importance to cost-accounting. Its effect on the final cost figures is likely to be so small as not to be worth all the time and energy given to deciding whether or not it shall be included. It seems undesirable, however, to pass the subject by entirely and so this article will be given over to a brief consideration of the more outstanding phases of the question.

Of course, the fundamental issue is whether it is correct to include interest, but the question of principle is intimately related to problems of method and questions of expediency. One of the reasons why this topic has been so confused in the minds of many who have discussed it is undoubtedly due to the fact that certain terms have been used by different groups of individuals in discussing the topic, terms to which rather different meanings have been given. There can be no real objection to the economist's using the term interest in one way if he finds it convenient and useful to do so, but there should be no objection to the business man's employing it in a somewhat different sense if he finds it satisfactory to do so.

Whatever the meaning of the word may be to the economist, to the average business man the word interest means a division of the net income of the business. Part of the net income goes in the form of interest on money borrowed at the bank, part of it in interest on bonds, and part in the form of dividends on capital stock while the remainder is retained in the business. If this conception of interest is held, then it is evident that it would be incorrect to include interest as an element of cost of production for it is rather a part of the distribution of profits.

If the other point of view is taken that interest is a cost of the use of capital just as wages is the cost of the services of labor then it is easy to see how interest may be thought of as a cost of production. In this case, however, to be strictly logical it would be necessary to include that portion of the dividend rate which would represent a fair interest rate on the part of the capital represented by the capital stock. From the economist's point of view this concept of interest is very useful in aiding him in his development of economic principles, but that is no reason why the business man should be compelled to adopt the meaning for his use when some other meaning is more satisfactory.

> THE KEEPING of a record of the amount of interest charged to the cost of production involves an expensive amount of bookkeeping, hence unless some adequate gain results from the process it should not be included as an element of cost.
>
> Under the most satisfactory of conditions it will be found that cost records for interest are not accurate and cannot be made absolutely so.
>
> Interest should be included if the executive is of the optimistic kind who is inclined to accept excessive risk, in order that costs may appear high.

One of the reasons why the divergence of ideas exists is because the economist in thinking of interest is concerned with business in the large and not with the problems of individual concerns. The appearance of the problem from the broadly social-economic standpoint is radically different from that of the business manager who is chiefly concerned with the successful operation of his business.

Bearing in mind the difference in the uses of the word, let us turn our attention to a brief consideration of some of the principal arguments for and against its inclusion as an element of manufacturing costs. One of the most striking of the reasons advanced in favor of its inclusion is in connection with comparative costs of various methods and kinds of equipment. The examples often cited are those of the ageing of wine or the tanning of leather, processes where it is necessary for the product to remain for relatively long periods in casks or vats and where, it is said, the cost of the process depends very largely on the interest which accrues during the period on the capital invested.

On the face of it, the argument seems impregnable, but a little analysis will show that such is not the case. If a proper burden application rate has been developed, the amount of burden actually charged to the goods going through the process will vary as the time taken. Hence, in comparing the burden charge for the two processes under consideration the time element will receive its proper weight. To include interest in both cases would increase the burden charge in both cases, but it would not affect the ratio between them to any considerable extent because under most circumstances interest, if it is included, forms only a small part of

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the burden rate. Of course, it would be quite impossible to use a percentage on direct labor hours or charge as a means of allocating the earned burden to the product; it would be essential that a process rate be worked out for the purpose. All of the methods are described in subsequent articles.

At the same time, if it is felt to be essential in any particular case to include interest in the comparison, it is not at all necessary to make it a part of the burden rate and so incorporate it in the cost accounts. It is quite possible to add interest as an estimated figure to the actual cost of the present method and as the cost of the proposed method can only be estimated in any case, the interest contained therein can only be estimated.

The Attitude of Bankers and Courts

While the opinions of those who are neither accountants nor manufacturers may be held to be of little weight in the discussion, it must be recognized that we are living in a practical world and must consider the opinions of those who are in a position to influence the outcome of the question. The courts and bankers are almost unanimous in their condemnation of the inclusion of interest, and since business executives must borrow money from the banks and have disputes among themselves settled by the courts, it is essential that their opinions be given due consideration.

The reason for the banker's attitude is due in large measure to his feeling that the inclusion of interest means an inclusion of a part of the profits or net income of the business as a cost of production, and that as a result, the inventory at cost price is improperly inflated. If interest represents a distribution of profits, their attitude is perfectly correct and understandable, but in any case, they are in a position to make their opinion prevail. Hence, if interest is included as a cost it is necessary to set aside a reserve to cover it till the goods are sold. The reserve to cover interest charged to cost is, of course, a credit balance and, when combined with the inventory accounts should give the correct value of the goods actually on hand.

The necessity of such records raises a practical problem of tremendous importance. To keep a record of the amount of interest charged to cost of production involves an expensive amount of bookkeeping, of which the net results are substantially nil since the accounts are all put into the same position that they would have been in if interest had not been included as a cost element. To those who have not had any experience in handling such a problem it may well appear relatively easy, but in actual practice it is one of the most difficult bookkeeping tasks which is likely to be met. Hence, unless some adequate gain results from the process the weight of evidence is against the inclusion of interest.

Perhaps, also, a better idea is obtained of the importance of the whole matter if one considers the difference in unit costs which result from the inclusion or exclusion of interest. In most cases, it will be found to affect the unit cost singularly little, a result which helps to dwarf the importance of the whole question. It also makes it evident that it is not worth expending large sums in order to apportion interest in cost, and then to take it out again because of the necessity of meeting the requirements of bankers.

The whole question of the use to which a cost account and record is to be put is raised here. If the value of the cost system depends on the accuracy with which it apportions every cent of expenditure for the benefit of the factory to some account, then, if interest is to be considered a cost of production, it is essential that the distribution be made no matter what it may cost to do so. If, however, the cost accounts are considered to be primarily an instrument of control, then it certainly is not worth expending large sums for a series of bookkeeping entries which do not enhance the accuracy of the control but do materially increase its cost.

Under the best and most satisfactory of conditions it will be found that the cost records are not accurate and cannot be made absolutely so. They are simply approximations to the statement of the real facts, and as long as this fact is borne in mind their value is not vitiated. No records are ever a substitute for intelligence and good judgment. The business executive must follow the example of the artist and mix his cost records with brains if he expects to find them really useful.

The anticipation of profits by the inclusion of interest as a cost of production needs further consideration before being left entirely. To some it may appear as quite illogical to insist that interest must not be charged as a cost of production, and hence, as a part of the inventory value of the goods until they are actually sold and shipped, and yet to permit the crediting of interest at that time as a gain. Is there any essential difference between assets in the form of an inventory of goods in the stock room and assets in the form of accounts receivable? It might even seem as though the inventory in the plant of the company were even a better asset than an account with another company for the company may use the goods and never be able to pay for them.

It must not be forgotten, however, that in many respects the account receivable is a better asset than the inventory. The goods are sold and accepted, and a legally enforceable claim is established thereby on the customer. The claim is not simply against the goods but against all the assets of the customer against which a prior lien has not already been set up. If customers are selected with reasonable care and an adequate reserve is arranged to provide for the occasional bad debts, the losses after the goods have been delivered and accepted are likely to be exceedingly small and are provided for by means of the reserve. Hence, it is logical to use accounts receivable as a basis of calculating profits while it may not be proper to include interest as a part of the inventory as long as they remain unsold. What was said about the insignificance of the variation of the costs when interest is included or excluded should be remembered in this connection, however.

Association Cost Accounting

It is often advanced by those who advocate the inclusion of interest and who are interested in association cost-accounting that such a step is necessary if costs are to be obtained which are comparable among the several members of the association. They bring out the proposition that if rent is to be treated as a cost by those who must rent their buildings, then it is essential that those who own their own buildings should include interest on the capital costs of their buildings if building costs and hence costs of production are to be comparable among the members of the association.

The argument seems to overlook the fact that even if interest were included the costs still would not be comparable unless we are to assume that the proprietor of the building would be content to receive profits equal

only to the rate of interest. Such an arrangement is sometimes made, it is true, when the lease provides that the tenant is to pay all maintenance costs, and the rent is substantially the depreciation on the building plus interest on its agreed value. Such cases are relatively rare, however, for the owner ordinarily expects to obtain a profit from his building over and above what might be considered as interest.

It would be more appropriate for the concern which is actually paying rent to charge as building costs only such items as it would charge if it owned the building. The difference between the total of such items and the amount actually paid for rent could then be carried directly to the profit and loss account as a distribution of profits.

On What Is Interest to be Charged?

There are two very practical questions to answer if the decision has been made to include interest as an element of cost. The first of them is: On what is interest to be charged? Is it to be interest on the net capital investment as is advocated by some, or interest on the fixed assets? If the latter, is the present net worth to be taken as the basis or is the original cost to be chosen. If interest is to be charged on fixed assets, is it not also proper to charge it on inventories of material-stores, worked material, merchandise, and if on these why not also on goods in process? If the answer is in the affirmative, how is the value to be determined since it is fluctuating day by day? Shall the value of each be used as a basis for the calculation of the interest, or the value on hand at the end of the month or the average value of each kind of inventory during the period in question? If interest is to be charged on liquid assets in this form, why should it not be charged on prepaid insurance and other prepaid expenses, and also on accounts receivable? Of course, interest actually paid out to bankers should be charged as a cost though an issue is raised at once in case the money is used for some other purpose than to aid production.

Other similar problems must be faced when one tries to decide on what interest is to be charged. To be strictly logical, it would be necessary to say that interest on everything should be charged, and when the attempt is made to put this into practice, many difficulties are encountered. It should not be inferred from what has been stated that it is impossible to ascertain a basis for the calculation of interest, but enough has been said to indicate that such an operation is attended with both theoretical and practical problems.

The second question referred to in the preceding paragraph is in respect to the rate of interest which is used in the calculation. Is it to be the rate paid by the savings banks in the community, or is it to be the rate paid when borrowing money at the bank, or is it to be some other rate considered fair and just for the business in question, and if the latter method is selected, how is its justness to be determined? Is the rate to fluctuate as the general interest rate changes with the general business conditions, or is it to be altered as often as the current market rate of interest oscillates, or is it to remain fixed for an indefinite length of time when once determined?

If the amount decided upon in the solution to the preceding is large, a relatively small variation in the rate of interest will cause a substantial difference in the amount of interest to be charged to cost, even though that amount is very small per unit of product turned out. As in the case above, the question is not unanswerable, but to work out a satisfactory solution is no easy task. The questions raise the same query about the desirability of including interest when looked at from the wholly practical point of view—is it worth the cost?

It is only worth the cost if it renders services of greater value than the cost. To a very considerable degree it depends on the character of the executive who is to use the cost accounts and records. If it will aid him in the control of his business sufficiently to make the gain more than the cost, then it is appropriate to include interest in spite of the attendant expense. If the manager is of the sanguine, optimistic kind who is inclined to accept excessive risk, then it may be well to include interest so that the costs may appear to be high, and his rashness may be checked, thereby. If, on the other hand, he belongs to the contrary class and is over cautious then it is certainly wise to omit interest and show the actual costs at the lowest consistent figure. It must always be remembered that interest can be added as a supplementary figure if it is ever required for control purposes, and so, any benefits to be derived from the calculation may be obtained without increasing the regular routine work of the cost department.

The whole question is not one involving moral turpitude. It is no reason for rejecting the services of a man because he believes one way or the other in respect to the question unless he becomes intolerant. It is almost wholly a matter of expediency, and it should be treated as a matter of expediency. Very rarely will it rise to any great practical importance among the cost-accounting problems which exist to be solved.

What Is a Screw Machine?

By John R. Godfrey

"Say, Johnson, what is a screw machine?" I asked the old man the other day.

"Damfino, Godfrey, and I don't believe you do either. It used to mean a small hand turret lathe for making machine screws. Now it seems to mean anything from an automatic for making small parts for watches up to a large turret lathe. Nobody knows what it means so far as I can find out.

"The screw machine, even the automatic, doesn't always make screws by a long shot. Of course it can, but so can a bolt cutter, an engine lathe, a milling machine, a thread miller, and so on.

"Of course, if we really wanted to be logical, we'd drop the name 'lathe' altogether, and call it a turning machine, or turner. But that's asking a lot, especially of us older chaps. There isn't any sense in the word 'engine' either, but we've been pretty firmly inoculated with the germ and its likely to stick.

"Any horizontal machine whose chief function is to 'turn,' can be called a lathe, with a handle in front of the name to tell what type of lathe it is. There's engine-lathe, turret-lathe, forming-lathe, low-swing lathe, flat-turret lathe, semi-automatic and automatic lathes, fox-turret lathe, etc. Screw machine doesn't seem to have any logical place in the list unless its chief function is to make screws. And even then, 'automatic screw cutting lathe' will fit the case just as well.

"It's about time we got some sort of a language most of us could understand."

Trigonometry Problems from the Drafting Room—Discussion

By Fred Stevins

THE following solutions are submitted to the problems that Mr. Thompson presented on page 652, Vol. 58 of *American Machinist*. The first problem, the conditions of which are shown in the accompanying illustration, can be treated as follows:

$$\frac{x}{4} = \frac{x+6}{\sqrt{225-(x+6)^2}}$$

Or, $x^4 + 12x^3 - 173x^2 + 192x + 576 = 0$

Whence,

$$a = 3 \qquad c = 48$$
$$b = -\frac{173}{6} \qquad d = 576$$

Solution by the method of Euler and Lagrange:

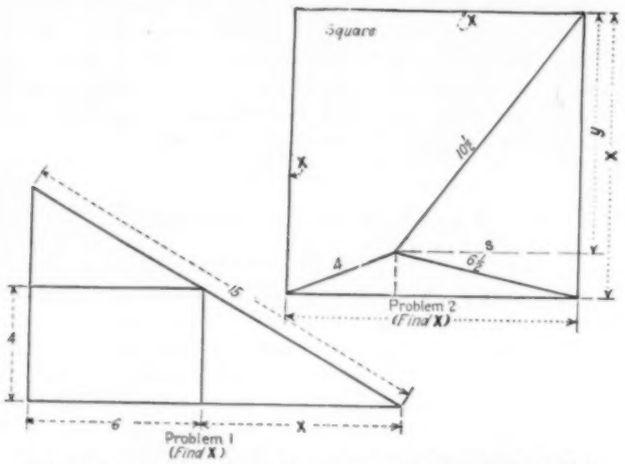
Put,

$$g = a^2 - b = \frac{227}{6}$$

$$h = b^3 + c^2 - 2abc + dg = \frac{1{,}820{,}683}{216}$$

$$k = \frac{4}{3}ac - b^2 - \frac{1}{3}d = -\frac{29{,}929}{36}$$

Then, since $\sqrt{h^2 + k^3}$ is negative, the solution must



TWO PROBLEMS ARISING IN THE DRAFTING ROOM

be made by the use of trigonometric tables.

Put $$r = \sqrt{-k} = \frac{173}{6}$$

and $$\sin 3\theta = -\frac{h}{r^3} = -0.351638.$$

Whence from the table of sines,

$$3\theta = 20°35'15'' + 180° = 200°35'15''$$
$$\theta = 66°51'45''$$

Then,

$$l = r \sin \theta$$
$$l_1 = r \sin (120° + \theta)$$
$$l_2 = r \sin (240° + \theta)$$

Of these values $l = r \sin \theta$ is the only one to make all the radicals of the root equations positive. Using this value of $l = r \sin \theta = 26.51398$,

$$u = g + l = 64.34732$$
$$v = 2g - l = 49.15268$$
$$w = 4u^3 + 3k - 12gl = 2{,}030.87667$$

$$\sqrt{u} = 8.02152 \qquad \sqrt{w} = 45.065249$$
$$\sqrt{v + \sqrt{w}} = 9.70659 \qquad \sqrt{v - \sqrt{w}} = 2.02174$$

Then,

$$x_1 = -a - \sqrt{u} - \sqrt{v + \sqrt{w}} = -20.72811$$
$$x_2 = -a - \sqrt{u} + \sqrt{v + \sqrt{w}} = -1.31493$$
$$x_3 = -a + \sqrt{u} - \sqrt{v - \sqrt{w}} = +2.99978 \text{ or } +3$$
$$x_4 = -a + \sqrt{u} + \sqrt{v - \sqrt{w}} = +7.04326$$

The positive roots, particularly the last, satisfy the given conditions for the value of x.

A method of solving Problem 2 is given in the following work, the significance of the letters being shown in the accompanying illustration.

$$s^2 = (10\tfrac{1}{2})^2 - y^2 = (6\tfrac{1}{2})^2 - (x-y)^2$$

Whence,

$$x^2 - 2xy + 68 = 0$$
$$2xy = x^2 + 68 \qquad (1)$$
$$y = \frac{x^2 + 68}{2x}$$
$$y^2 = \frac{x^4 + 136x^2 + 4624}{4x^2} \qquad (2)$$

$$16 - x^2 + 2x\sqrt{\left(\frac{21}{2}\right)^2 - y^2} - \left(\frac{21}{2}\right)^2 + y^2 = x^2 - 2xy + y^2$$

$$2x^2 - 2xy + \frac{377}{4} = 2x\sqrt{\frac{441}{4} - y^2}$$

Substituting values for $2xy$ and y^2 from (1) and (2),

$$x^2 + \frac{105}{4} = \sqrt{-x^4 + 305x^2 - 4624}$$

Squaring to remove the radical,

$$x^4 - \frac{505}{4}x^2 + \frac{85{,}009}{32} = 0$$

$$x^2 = \frac{505}{8} \pm \frac{1}{8}\sqrt{85{,}009}$$

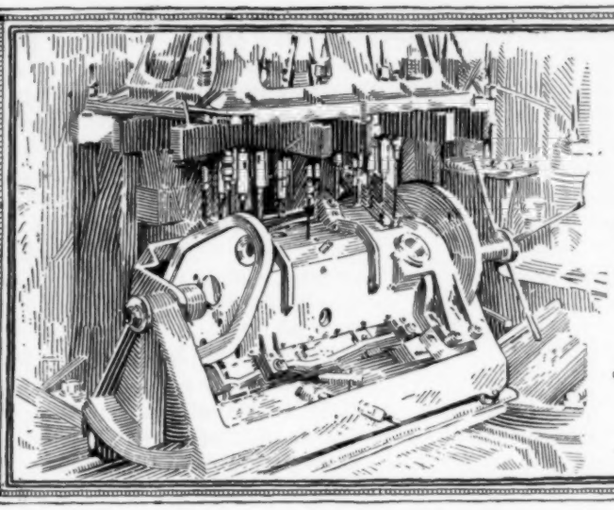
$$x = \pm\sqrt{\frac{505}{8} \pm \frac{1}{8}\sqrt{85{,}009}}$$

$$x_1 = +\tfrac{1}{2}\sqrt{398.2798} = +9.9784$$
$$x_2 = -\tfrac{1}{2}\sqrt{398.2798} = -9.9784$$
$$x_3 = +\tfrac{1}{2}\sqrt{106.7202} = +5.1652$$
$$x_4 = -\tfrac{1}{2}\sqrt{106.7202} = -5.1652$$

The first root, or 9.9784 for the side of the square, satisfies the conditions. The other positive root 5.1652 is for use when the point of intersection of the three known lines lies outside the square.

A Sculptor Mechanic

Those who read the article on page 825, Vol. 58, of the *American Machinist*, will be interested to learn that the sculptor, Douglas Tilden, is a deaf mute. They will also be disheartened to know that, in spite of having produced a number of notable pieces, he has been unable to earn a living in this way and has for several years been working as a mechanic in the shop of the Johnson Gear Co. of San Francisco. It is certainly a pity that in this country of ours a man who can produce work of this kind should not be able to find enough to keep him busy, while others who produce nothing, artistic or otherwise, have no such difficulty. It is to be hoped that he may again have the opportunity of producing other and equally pleasing work along sculptural lines.



Tool Engineering

By
Albert A. Dowd and Frank W. Curtis
President and Chief Engineer
Dowd Engineering Company, New York City

Inspection gages continued—Principles involved in automotive gages—Inspecting connecting rods—Gage for camshafts—Value of indicating gages

IT IS essential that the tool designer who undertakes to design gages should be very familiar with the requirements and functions of any piece of work which he intends to gage. The fundamental points which require careful consideration in any gaging problem have been treated to some extent in a previous article, but there are many special matters which are dependent upon the shape of the part and the manner of its functioning, which cannot be treated in the form of general notes.

In the first place, the designer should know or find out positively just how the part which is to be gaged functions in the completed mechanism. If he is able to do this and if he can analyze the importance of various fits and the location and importance of holes and surfaces, he has made a long step in the right direction. If unable to do this, he must depend entirely upon the drawing of the part for which he is making gages and must be guided by the limits given. There are many cases, however, when alignment of various holes, concentricity of diameters and angularity of surfaces or holes are of the greatest importance, and yet the drawings for the parts would not always specify limits on these points.

Aligning Holes in Connecting Rods

In order that any two or more parts may function properly, the alignment of holes and concentricity of diameters are of great importance, but often the only mention which is made on a drawing of the part which will give the designer any information is the limits on the size of the hole or the location of the surface. To a man who is unfamiliar with the general design of a machine, the problems which he encounters in gaging the various components of that machine are difficult of solution. In our opinion it is very necessary to make a study of the mechanism, and if there are certain troubles which are likely to be encountered due to a lack of alignment or eccentricity of holes, these points should be very carefully determined before any attempt is made to design gages.

In automobile work the gasoline motor presents to the designer a number of problems in gaging. He may know from his own experience that a piston in which the wristpin is out of alignment will cause the piston to scrape along the walls of the cylinder, yet he will find no mention of the importance of this matter on the drawing of the piston. So also, in many other parts of an automobile the alignment of holes and positions of surfaces must be very carefully studied. Let us take

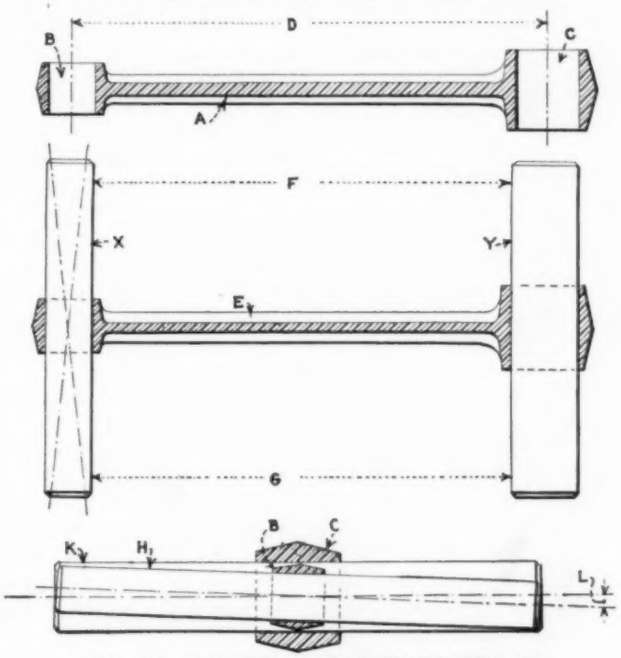


FIG. 551—IMPORTANT GAGING POINTS ON CONNECTING ROD

a few examples of various kinds in which the importance of the different dimensions is not apparent on the blueprint of the part.

Almost any connecting rod in a rapidly moving mechanism, whether it is an automobile motor, air pump or any other similar mechanism, is a good example to use in order to bring out the importance of alignment of holes. Fig. 551 shows a simple form of drop-forged connecting rod *A*, on the drawing of which the dimensions *B*, *C* and *D* are carefully specified with limits. To the designer who does not realize the way in which the connecting rod works, there would be little cause

For the authors' forthcoming book. All rights reserved.

to worry about the gages needed for this part; and he would in all probability design limit plug gages for *B* and *C* and test the dimension *D* by means of plugs in the holes *B* and *C*, a measurment being taken across the plug. He would then apparently have fulfilled the gaging requirements for the piece.

If he were familiar with the mechanism and the functioning of the connecting rod, however, he would realize that the alignment of the two holes *B* and *C* is of extreme importance, and he would provide for testing

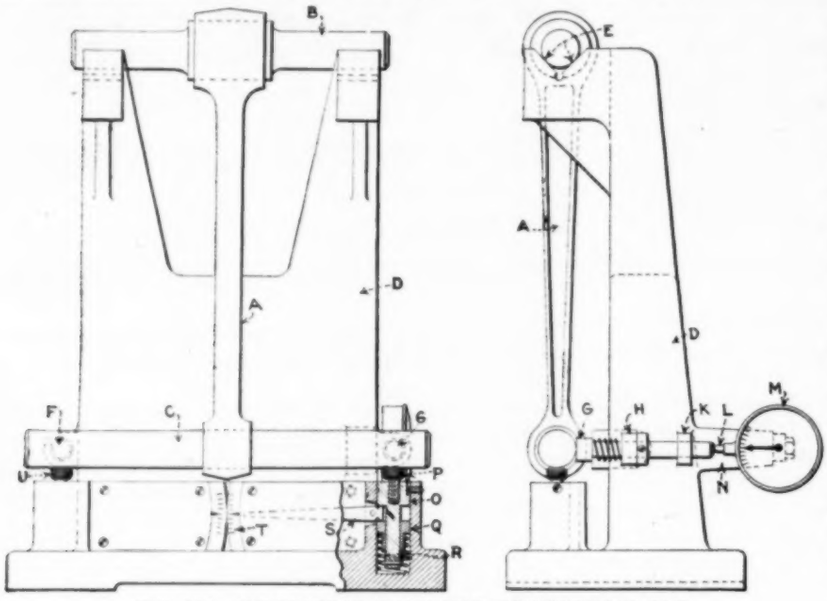


FIG. 552—INDICATING GAGE FOR CONNECTING ROD

these portions by means of well designed indicating gages. A lack of parallelism between the two holes would cause friction in the inside of the cylinder, the motor would heat up and wear badly, and the general results would be very unsatisfactory. It is important, therefore, that these holes should be as nearly parallel as possible, and as both of them are short in comparison to their diameters a small error is not easily determined.

By referring to the diagram *E* the use of long pins *X* and *Y* in the two ends of the connecting rod will permit errors to be readily found at *F* and *G*; and if the holes are not parallel, these two dimensions will be different and must be corrected before the connecting rod can be considered ready to pass inspection. There is another point of importance which is illustrated in the diagram below. The twist of the connecting rod may also be a source of a great deal of trouble. The pins *K* and *H* in the holes *B* and *C* can be out of alignment in this direction, as shown in exaggerated form at *L*. This condition can be easily found when testing in a suitable fixture.

The designer will appreciate the importance of these things more fully if he has practical knowledge of the working of a given mechanism. The shop man who is assembling the testing machines from day to day knows from experience the damage which can be caused by errors of this kind. The drafting room, therefore, is to some extent dependent upon the information received from the shop, unless the engineers realize the importance of analysis and treat the gaging problem from a scientific standpoint.

There are two types of gages used in testing connecting rods. In one of these types the rod is tested for alignment and provision is made for straightening it *in the fixture*. The other type simply tests the work, which *is removed* for straightening and then retested after corrections have been made. There is a difference of opinion as to the advisability of using an accurate testing fixture for straightening and correcting errors. The writers do not believe that it is generally good practice to do this, as there is a likelihood of springing or otherwise distorting the fixture when the straightening operation takes place. However, it is possible to design the testing fixture in such a way that it will withstand these strains, and it is largely a matter of personal preference as to which method is used.

In the example shown in Fig. 552 the connecting rod *A* is to be tested to make sure that the holes at each end are in alignment and that there is no twist in the rod. The type of fixture shown here has been found successful in showing small variations, and the work can be tested very rapidly and with precision. We have shown in the previous illustration by means of diagrams, the importance of alignment of the two holes in the ends of the connecting rod. In analyzing the gaging operations necessary for this work, we must first remember that a multiplication of the errors in order to make them more clearly apparent is very desirable.

In the design shown here the pin *B* is pressed into the large end of the connecting rod, while one at *C* is placed in the small end. Both these pins are several times longer than the holes in which they enter, in order to obtain a multiplication of any errors which are found. The upper pin B rests in V-blocks *E* which are a part of the fixture *D*. The other pin *C* is held down by the operator's fingers and pressed back against a fixed stud *F* on one side of the fixture. In the same position but on the other side of the fixture the spring pin *G* is so arranged that it passes through the lugs *H* and *K* and bears against the end of the pin *L*, which is a part of the indicator *M*. This indicator is supported by a lug *N* at the rear of the fixture. By setting the indicator point so that it reads zero when the pin *C* is in perfect alignment with pin *B*, any variations from the true position will be readily shown by the fluctuations of the needle on the indicator. This dial takes care of any twists in the pin, but there is also another matter to be considered, and that is the possibility of an angularity of the holes in the other direction.

Indicating Gage for Connecting Rod

The plug *O* extends down through the sleeve *Q* and has a spring *R* at its lower end to assist in preventing lost motion. The sleeve *Q* is spring supported. The upper part of the plug *O* has in it a knurled screw *P*, which may be provided with a check nut if desired. This screw makes it possible to adjust the pin to the correct height as determined by a master plug or block. The pointer *S* operates on a graduated dial *T* so as to show a multiplication of the errors in alignment. The other side of the gage has another adjustable stud *U* arranged in an exactly similar manner.

It will be seen that any variations from the true alignment will cause fluctuations of the indicator point along the graduated scale. If the two pointers are opposite each other, no matter whether they are on the zero line or not, it will be an indication that the pin *C* is perfectly true. If there is a slight angularity to the pin *C*, one of the pointers will be up and the other one down. This type of gage is very rapid in use; and while it may require the operator to use a small amount of pressure in holding the bar *B* down in the V-block, in the majority of cases the springs can be so proportioned as not to require this to be done. The operator must, however, push the lower end of the connecting rod back until it is in contact with the plugs *F* and *G*. Various other gaging problems which have to do with alignment of holes can be solved by the use of devices similar to the one just described. In different cases the methods of locating and operating might be radically different on account of the construction of the work, although many of the principles involved would be identically the same.

There is considerable difference in the methods employed for testing the throw of cams on a camshaft, due to the different constructions used by various manufacturers. In some cases the gears which operate the camshaft are located on the end of the shaft by a key. Occasionally the end of the shaft is tapered, while at other times it may be squared up or provided with other means of locating, so that the proper relation between the gear teeth and the cams will always be maintained.

When the tool designer attempts to make a testing gage for determining the accuracy of a camshaft, he must first be sure that he understands the points of importance which must be gaged. It is oftentimes advisable to reproduce to some extent the actual working operation of the camshaft in making a gaging fixture.

In Fig. 553 is shown a testing fixture for a two-throw camshaft *A* having cams directly opposite each other at *B* and *C*. This particular type of shaft has a flange *D* at one end which locates in a recess in the gear that operates the shaft. Dowel and screw holes are also provided to insure accurate location. The testing fixture used for this example consists of a base *E* having a lug *F* at one end which is cut out in V-block form at *G*. This *V* is used to locate one end of the camshaft, which is lightly clamped in place by means of the strap and thumbnut *H*. The other end of the shaft locates in a recess in the locating or indexing plate *K*. This plate has four pins in it corresponding in their locations to the dowel holes in the flange. The index plate is keyed to a shaft *L*, on the end of which there is a knurled knob *M*. A hardened liner bushing *N* is provided to avoid excess wear. The index plate *K* is furnished with bushings at *O* for indexing purposes, and the plunger *P* is spring controlled and operated by a movement of the finger lever *Q*.

The inspector places the camshaft in position as mentioned and indexes it by means of the index plate *K* into the various positions required for testing the cam. It is assumed that diameters and lengths have previously been gaged, as this fixture does not test these dimensions. The important parts of a cam are the "throw," the small diameter and the contour. These points, therefore, must be taken into consideration when gaging. It will be seen that the surface of the fixture *R* is finished accurately to provide a testing surface which bears a certain relation to the center line of the camshaft.

In order to determine the throw of the cam, the sliding gage *S* is moved along over the surface *R* until it strikes over the point *T*. If the work has been done within the required limits one portion of the gage *U* will go over the cam, while the other will not. The low part of the cam is gaged by a similar piece *V*, which either goes or does not go across the portion of the cam *W*. An indicator with a suitable set-block is sometimes used instead of the "go" and no-go limit gage shown, and it will produce equally good results. There is always a possibility, however, of the operator disturbing the setting of the indicator gage and thus causing trouble. With the type of gage we have just shown, errors can be caused only by wear in the gage or by extreme carelessness on the part of the workman.

A knife-edged gage *X* is mounted on a block *Y* for testing the shape of the cam. The plate which is used for gaging is carefully formed to the angle of the sides of the cam, and it is pushed up in place so that the operator can look through against the light and see if there are any variations in the form *Z*. This gage is in the nature of a receiver type gage, and there are some manufacturers who recommend the use of go and no-go templets. In either case, however, the eyesight of the operator is called into use to some extent. For testing the diameters of the camshaft and the relation between cams other gages are generally used, but these points can easily be tested by the use of snap gages.

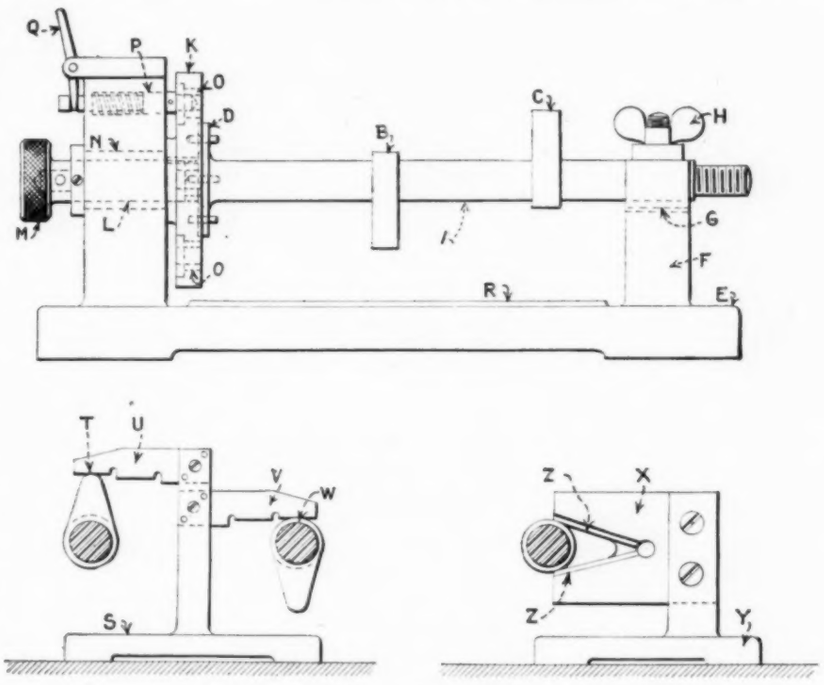


FIG. 553—TESTING FIXTURE FOR CAMSHAFT

Machinery which was dug up with old King Tut was good enough, perhaps, when he was living, but—

It Pays to Replace

By Adele L. De Leeuw

The Jones Works built its first machine in 1886.
It proudly claims to be "an old concern."
And just in time it found that, though old dogs can't learn new tricks,
If shops desire to live, they have to learn.

The sales were good enough, it seems, until deliveries fell
So far behind that customers grew cross,
And salesmen muttered, "Can't you even make what we can sell?"
And profits quickly melted into loss.

Then Jones began to feel that things were looking rather grim,
So fearfully and desperately he said,
"I'll get an expert in and put the whole thing up to him—
He can't do worse than say that we are dead."

The expert spent three days in finding out just what was wrong
And then he went to Jones and hands in jeans,
Delivered this extremely short and bitter little song,
"You'll have to chuck out all your old machines."

"Chuck out the old machines!" J. cried—in fact, he nearly wept—
"Why, man, you must be crazy! We would be
Completely done!" The other said, "I wish that I had kept
A list of those who've said such things to me.

"You seem to think that you should treat machines as you treat men:
If they have served you from their youth, you hold
That, though they are a bit uncertain now and then,
It is but just to keep them when they're old.

"Well, true enough. Besides, a man, though shaky in his hands,
Has stored up knowledge and a deal of skill.
From long association there are things he understands;
He can be very helpful if you will.

"But when machines begin to creak and halt and groan and sigh
And wobble, mutter, chatter, cough, and rap,
You are not stony-hearted when you bid them swift good-bye
And send them out, unpensioned, labelled 'scrap.'

"Then, too, there is another thing: you can't afford to make
An operator act as semi-nurse;
You handicap yourself and him—and merely for the sake
Of keeping something bad from getting worse.

"As long as your machines require the minimum of care,
Just so long should they stay inside your shop.
But once they start to fail you, mark my word, Jones, and beware—
Chuck out the old, and buy a nice new crop."

He left Jones sitting at his desk, with deeply knitted brow,
As if the lesson still were sinking in.
But sink it did, for there are two additions building now—
And Mr. Jones has work up to his chin.

Miss De Leeuw is the daughter of A. L. De Leeuw, Consulting Editor of *American Machinist*. She frequently contributes to the New York dailies. The article was not a contribution to the prize contest.

Milling Forty Driving-Box Wedges in Eight Hours

By FRED H. COLVIN
Editor, American Machinist

Special fixtures and methods at the Burnham Shops of the D. & R. G. Railroad which reduce locomotive repair cost—Lapping the piston rod in the crosshead

ALTHOUGH the Burnham shops of the Denver & Rio Grande Railroad lack many modern facilities, such as cranes, they are using many interesting methods in getting out work as economically as circumstances permit and are utilizing manufacturing practices wherever there is sufficient standardization, or the parts to be made can be handled in sufficient quantities. An example of this is shown in the method

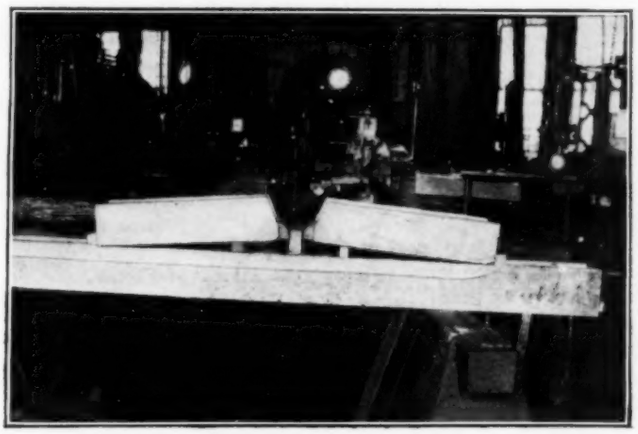


FIG. 1—HOLDING DRIVING-BOX WEDGES FOR MILLING

of machining driving-box wedges and shoes by string milling on an Ingersoll milling machine.

Two of the wedges are shown in place on the fixture in Fig. 1, although the fixture was not mounted on the milling machine when this picture was taken. The construction of the fixture can be seen in the sketch in Fig. 2. The fixture itself consists of a long channel which holds from six to eight wedges according to size. Grooves at the sides near the top, as shown at *A* and *B*, receive and guide the ears of sliding jaws, two of which are shown at *C* and *D*.

It will be noted that these sliding jaws have serrations or teeth on each side, cut at such an angle as will tend to force the work down onto the top of the fixture and hold it firmly. One double-faced jaw is placed between each of the wedges and in each jaw is a hole through which a long threaded rod passes. Nuts on this rod draw the end jaws together and in so doing clamp all the wedges between them.

The jaw shown between the wedges in Fig. 1 is made specially high in order to grip the ends which are tilted up to secure the proper taper on the inside. The jaws at the outer ends of the wedges are of the standard height. It will be noted that the angle of the wedges is secured by the location of the small square bars placed under the thin end. With six or eight wedges strung along the fixture in this manner it will readily be seen that they can be milled at a fast rate. In fact, where eight wedges can be put on the fixture at one time, the machine handles forty of them in an eight-hour day.

When machining shoes, which have no taper, the regular low jaws are used and only project a sufficient distance above the fixture to grip the shoes firmly, allowing the milling cutter to pass from one shoe to the next with due clearance for the jaws. Both the shoes and wedges are of brass.

Fixture for Milling Crosshead Shoes

Another job for which this fixture is used is the milling of crosshead shoes, which are also of brass. The blocks, as shown at *A*, Fig. 3, are made to fit the top of the fixture, the upper sides being of the proper

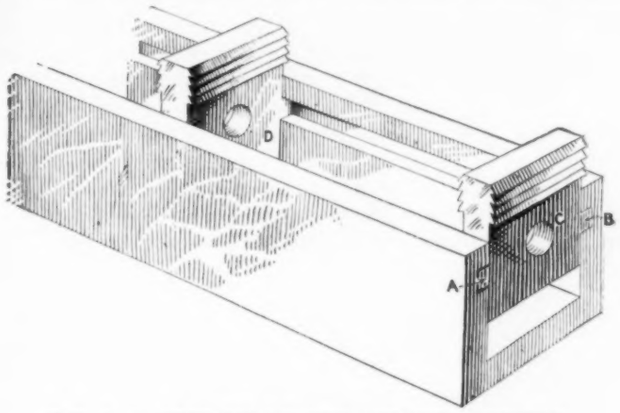


FIG. 2—A SECTION OF THE MILLING FIXTURE

size and shape to carry the bearing portion of the crosshead shoe when turned upside down as shown at *B*. Crosshead shoes are also held by toothed jaws, and the surfaces shown in heavy outline are milled at one pass of the cutters to fit the crosshead. The shoes are then placed in the crosshead and held in position by straps and bolts as shown in Fig. 4, when the bolt holes are drilled and the shoes fastened in place.

The crosshead is now ready to be fitted to the guides in the usual manner, which is to mount it on a mandrel

representing the piston rod, the mandrel being held level in V-blocks on the planer table. The shoes are then planed to the proper size and the uniform distance on each side of the piston rod is secured by turning

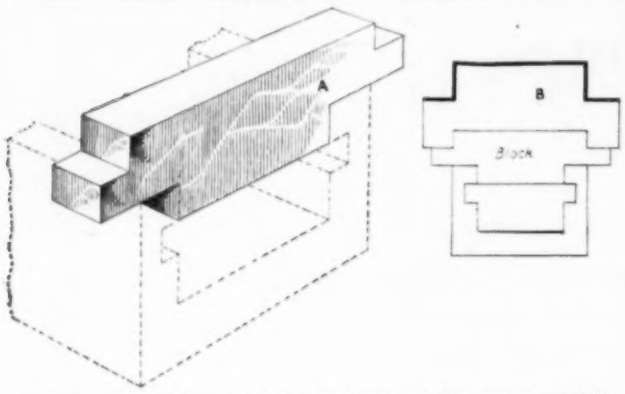


FIG. 3—BLOCK USED FOR HOLDING CROSSHEAD SHOES

the mandrel a half revolution in the V-blocks so that the second shoe can be planed to the same center distance as the first.

The shoes have diagonal wearing strips of babbitt cast in place as shown in Fig. 5. When the shoes become worn the entire bearing surfaces are babbitted, there being no difficulty in securing perfect adhesion between the brass and the babbitt lining. This is one of the reasons for using a brass shoe instead of one of either cast iron or cast steel. The shoes are manufactured to standard sizes on shop orders and are held in stock, partly finished, until they are needed to be fitted to the crossheads. In order to insure a good fit of the crosshead on the piston rod taper, the two are ground together as shown in Fig. 6. The piston rod is clamped to the end of a work bench and the crosshead lifted up over it by a chain block suspended from a small jib. The crosshead is lowered until

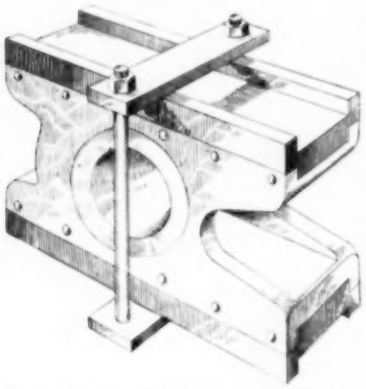


FIG. 4—HOLDING A CROSSHEAD SHOE FOR DRILLING

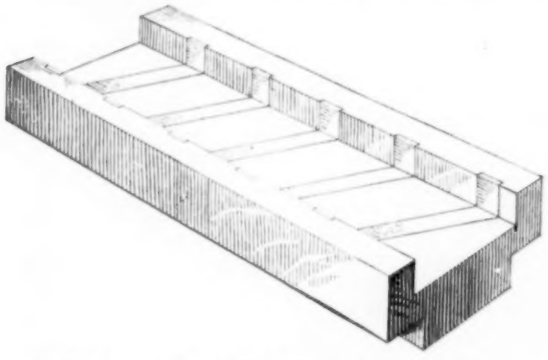


FIG. 5—BABBITT STRIPS IN BRASS SHOE

it makes contact with the taper fit on the rod, fine carborundum being introduced as an abrasive. The crosshead is then turned by hand around the rod and the joint ground, or lapped, until a perfect fit is secured. The chain hoist makes it easy to lift the crosshead off the rod for examining the bearing or for cleaning off the abrasive. The writer is indebted to shop superintendent Stevens, general foreman Strong and machine-shop foreman Frye, for the opportunity of illustrating these methods. The examples are typical of those to be found in railroad shops that are attempting to better their methods of operation.

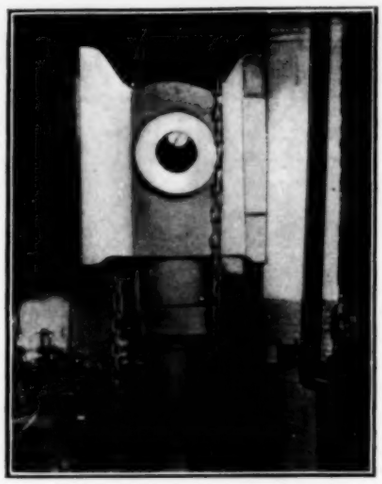


FIG. 6—LAPPING THE PISTON ROD FIT IN CROSSHEAD

Watching the Efficiency Engineer

BY JOHN R. GODFREY

The Black Motor Co. is undergoing the throes of being systematized by an efficiency engineer. Guess they need it all right but it's almost as bad as an operation for appendicitis was in the old days, about one out of ten survived the operation. It happened in this wise.

The old manager, Ed Hughes, was a peach in handling men and did wonders with the plant during the war when nearly everyone else was having all kinds of trouble with labor turnover. But a little while ago the bankers got the notion that the plant wasn't quite scientific enough and turned it over to an alleged expert.

I guess there is plenty of work to be done as Hughes was much better on handling men than on methods and machinery and there's a great opportunity for some one to make a good showing, if he doesn't disrupt the whole works while he's about it. The new man comes in, sees plenty of room for improvement, and goes dippy with the idea that he must change everything from the errand boy to the way the shipping labels are made out.

The worst case I know of is when they turned the old Price-Abbott Motor inside out, redesigned the whole motor and put out a new car under the old name. Then things began to happen.

The new motor didn't always mote, frames began to break and the good "rep" of the old company began to fade away into nothingness. In two years they had swapped a bank balance for a heavy deficit and their friends were few and far between.

Finally the bankers woke up and scurried around till they got back some of the old men who knew how to build cars even if they didn't know all the latest blank forms for finding out how much money you lost last year. And the old Price-Abbott is coming back, but it's an uphill fight.

It's quite likely that the experts did some good things, which will stick. But it's a risky game turning your plant over to a set of men who have everything to gain and nothing to lose, and who know little if anything about the motor game. I'm hoping the Black Motor Co. won't have this experience.

Our Immigration Needs

BY JAMES A. EMERY
General Counsel, National Association of Manufacturers

Flexibility of quantity and selective composition desirable—Shortcomings of existing law—Unbalance between wages and commodities caused by labor conditions—Constructive policy necessary

THE subject of immigration is at once of great importance and delicacy. I know of no other issue upon which prejudice may be more easily excited or which so vitally touches our economic and social life or in which the position of industry is so generally misrepresented and misunderstood.

Industry opposes extreme efforts to prohibit immigration under the guise of restriction, and is said, therefore, to favor unrestricted immigration. I know of no industrial executive or association that does not believe unrestricted immigration injurious, and at the same time, does not believe in a constructive policy of selective immigration.

The alien is easily represented as threatening us with economic injury through lower standards of living, and as a menace to our political institutions by subversive ideas and exciting disorder and crime. The gates should be closed against the diseased, the defective, the criminal, the potential public charges, those incapable of citizenship or belonging to races of demonstrated unassimilability, and all who undertake to accomplish political changes by violence.

The United States has developed in continuing reliance upon immigration to supplement its native labor supply. Since the Civil War this has been especially true in carrying forward the rough work of expansion. In a century we have received more than 30 million aliens, but 80 per cent of our present blood is of the six fundamental Revolutionary stocks.

As the development of the Nordic countries lessened their immigration stimulus, the proportion of immigrants from eastern and southern Europe has increased. These newcomers have colonized in the cities and are less assimilable but the national government has made no substantial effort for naturalization. The present law offers no aid in meeting the situation of those already here and simply lessens the number that may come in.

CONSTRUCTION LABOR PROBLEMS

Due to war conditions, we had practically six years without immigration, followed by a year in which the flow so excited our fears that we passed the present law. Our yearly immigration quota is now substantially 357,000 and the House Committee on Immigration proposes to further limit the number to about 187,000 per year. Considering the sex and age of the immigrants, the gain in our adult male producing population has been very slight under the new law.

We are now facing the largest construction requirements in our history and construction in every form presents permanent overhead charges upon national life. Production, distribution and commerce are carried on in structures whose costs of construction and maintenance are a direct tax upon every service or commodity available in the structure. The farmer in the remote West is thus keenly interested in the cost of building in the East where business affecting him is transacted.

When construction charges pass an unendurable level, they react upon themselves, and so the whole construction problem of the nation has been systematically diminished during the past few months. Our laborers migrate from South to North and from East to West in response to uneconomic competitive bidding for the inadequate supply, and this unsettled condition means a lift in all costs and an increase in the unbalance between the buying power of agricultural products and the cost of industrial services and commodities. Nor does the industrial laborer benefit. He gains in nominal wages; he loses in real wages.

A SUGGESTED POLICY

A decent consideration of national interest suggests that we shall oppose prohibition of immigration under the guise of restriction. Secondly, we should provide for administrative flexibility in the present law to meet our demonstrated economic need and, thirdly, we must at once begin work on a permanent constructive policy of selective immigration. We should not only pick racially and by occupation, but so far as practicable, determine admissibility before embarkation and accumulate, by co-operation between the States and the nation, reliable data on immigration needs and opportunities, which will give rational guidance to distribution.

The United States should assume the obligation of instructing and preparing for naturalization the alien who truly desires to incorporate himself into our society; but to this end, it should assert the right to register him during the period of his alienage, induct him into citizenship through appropriate ceremonial which emphasizes the privilege, and simplify the procedure of deportation so that the alien of pronounced criminal tendencies or the violent subverter of our institutions may be expelled.

The short-sighted effort to deny the adequate reinforcement of our native labor supply threatens to permanently impress upon us a continually increasing cost of living that threatens our natural living standards. It also excites a continuing discontent by denying to the average citizen the opportunity to fairly participate in abundant production, efficiently performed at reasonable cost.

Abstract of address to the directors of the National Lumber Manufacturers' Association, San Francisco, July 25, 1923.

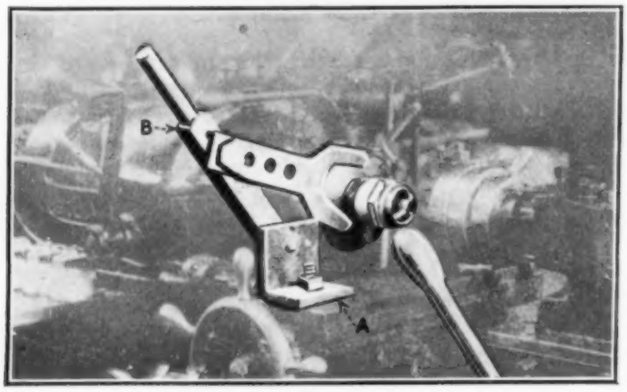
Ideas from Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for

An Ever-Ready Wrench

BY HENRY M. CLARY

In machining foot-valve parts for underground oil tanks, at the plant of S. F. Bowser & Co., Fort Wayne, Ind., the wrench shown in the illustration is used for



AN EVER-READY WRENCH

screwing them on and off the adapter on the machine spindle.

To avoid having to lay the wrench down and pick it up again each time the work was changed, the operator attached the wrench to the machine as shown. The angle plate *A* was fastened to the carriage of the machine and the lever *B* attached to the angle plate. The wrench was bolted to the lever *B* in such position that by moving the lever forward, the wrench engaged the work and held it for screwing on or off, according to the direction the spindle was running.

A Handle for Flat Filing

BY E. V. ALLEN

We have considerable flat filing to do in our shop and using files with the ordinary wooden handles on the tang on work of this kind is rather difficult. After some experimenting we had a number of handles made as shown in the illustration. The handles were cast from scrap brass. The two lugs shown at the front are stationary. The clamping jaw is placed on the opposite side and about half way between the two lugs. The clamping jaw is little more than a small block of brass tightened by a screw run through the body of the handle. The handles require no machining other than to drill and tap the screw holes. The clamping screw used is a fillister-head machine screw with a cross pin run through the head for a finger hold.

A HANDLE FOR FLAT FILING

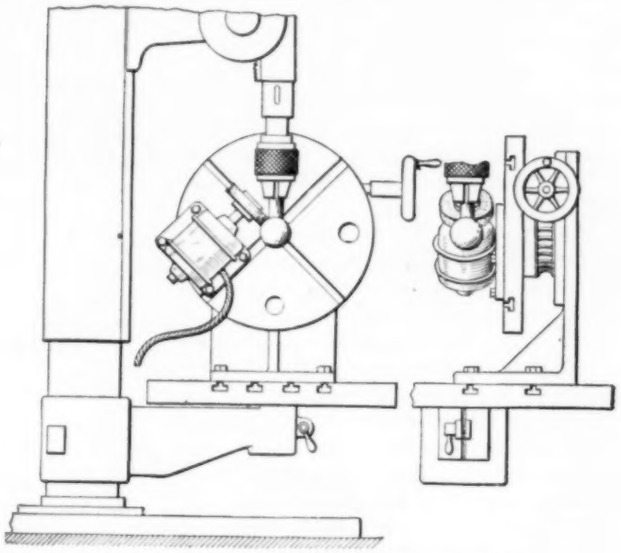
The handles are clamped to a flat file just back of the middle and the file is used like a plane. It is surprising how much easier it is to file flat work with this device.

Spherical Grinding on a Drilling Machine

BY GEO. A. LUERS

Machining the ball ends of ball and socket connections with shaping tools is readily accomplished on the lathe. A concave tool can be used and if it is properly shaped, a finished ball can be obtained.

Hardened steel however is not readily made spherical, inasmuch as the grinding is generally done with a flat-faced wheel. Compound movement of the work, cutting wheel and feed is required to grind the ball end. Such



SPHERICAL GRINDING ATTACHMENT

work is readily accomplished with the set-up indicated in the attached sketch. The only equipment required is a drill press, a portable electric grinder and a work-holding chuck taken from a milling machine, shaper or similar machine and fitted with a screw for circular feed.

As shown in the accompanying sketch the ball-ended work is held and rotated in the chuck of the drilling machine. On an angle plate attached to the machine table is mounted a circular attachment carrying a portable electric grinder. The center of the circular attachment is set at the center of the work to be ground. With the work rotating slowly in the machine, the circular attachment is used to guide the grinding wheel about the ball.

Insuring Proper Hardening

BY DONALD A. HAMPSON

In shops where the hardening of carbon steel parts is only an occasional job, the loss connected with hardening is considerable. A piece that represents some hardening difficulties is the T-slotting cutter shown in Fig. 1. Granted that the cutter part may readily be hardened all over, there is a risk in the region where the shank joins, and the all-too-familiar condition on withdrawing it from the quenching bath is in two pieces. If the cutter is successfully hardened, there follows the slow job of drawing the temper and the even chance of getting the teeth too soft in some spots and leaving them too hard in others, besides the natural tendency to draw the teeth and leave the center so snappy that the cutter breaks off when taking a full cut.

While experienced men know of these difficulties, they have to be reminded of them from time to time. In specialty plants, ways of hardening have been perfected that put heat treatment on the same production basis as metal cutting, but these ways are of little use to the workman whose only equipment is a forge or a small furnace, a pair of tongs and a container for the quenching bath. Yet with no more equipment than the above, it is possible to harden T-slotting cutters and similar pieces at an overall cost that compares favorably with production methods.

The arrangement of the bath for hardening and drawing is shown in Fig. 2, both operations being done at the one setting. The hardening bath is just clear cold water. The container may be a pail, pan or tub capable of holding such a volume of water as will not be made hot by the quenching. The cutter or other work to be hardened is laid on a piece of metal placed in the tank to keep it off the bottom. Water is poured in until it submerges part of the stem of the cutter shown—from ¾ to ½ in. of submergence will do.

When the cutter has been brought to the proper heat, it is plunged into the water and left there, resting on the metal piece in the bottom of the tank. The cutter will cool off gradually except on the thinner teeth which are in contact with the water and which will chill first anyway. The cutter will be prevented from cooling so

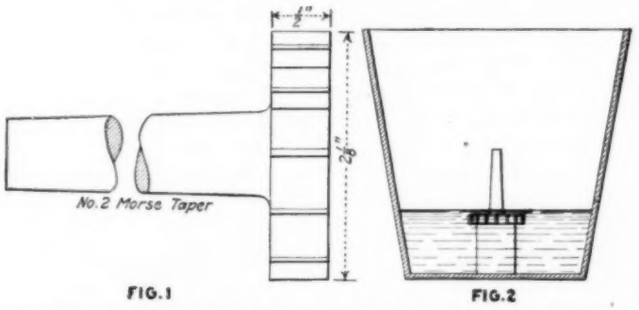


FIG. 1—CUTTER TO BE HARDENED. FIG. 2—ARRANGEMENT OF QUENCHING BATH

fast as to be hard all over by the heat in the stem, which will be carried down into the cutter, drawing the temper of the center but not being great enough to draw the teeth, as they are surrounded on all three sides by water.

With this method there is practically no risk, the familiar water crack is avoided, the cutting edges are hard, and the entire piece is drawn so as to insure strength and wearing qualities. The prerequisites are to have the piece heated slowly, thoroughly and away from the direct air blast in the fire.

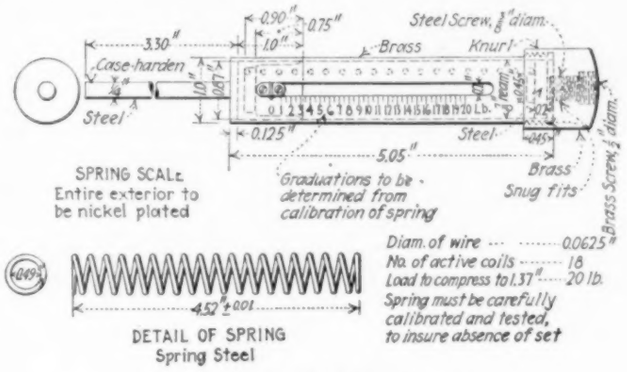
In heating the cutter, the entire stem or only a portion of the stem may be brought up to the same heat. This will provide the heat for drawing the end and avoid that dangerous line of demarcation in heating, where a thin section joins a heavy one. There is no danger of hardening the part of the stem that is submerged for it is so near the surface of the water that the water heats up and is kept hot by heat fed down from above.

The method is so simple that one doubts its worth until it is tried. The work is put in the water and left until cool enough to handle—that's all there is to it.

Compression-Spring Balance

BY G. W. NUSBAUM

In the shop or laboratory there is often occasion to weigh some force that is required or produced in some mechanism, and this is difficult to do with an ordinary tension-spring balance without considerable rigging, as



COMPRESSION-SPRING BALANCE

would be the case with inclosed levers, hydraulic and pneumatic pistons, etc. To be able to weigh these forces the writer designed the compression-spring balance shown in the accompanying sketch.

It will be noted that an adjustment is provided in the handle for changing the assembled length of the spring by removing the outer plug and moving the inner screw in the desired direction. This obviates the necessity for making the spring with extreme accuracy.

A Suggestion to Draftsmen

BY ELMER C. HIEBSCH

In designing machines, it often happens that levers, rods, special bolts and other parts, the same as used on machines built previously, can be profitably utilized in the new machines.

As it is difficult to keep in mind all such parts that have been made for other machines and to avoid duplicating any or all of them, the following method is suggested:

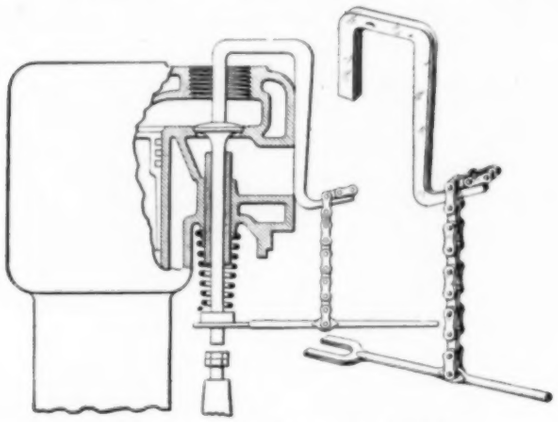
Make duplicate blueprints of the separate parts of all machine designed and file them alphabetically under their respective names. Then if a rod lever or other part is needed for the machine being designed, look over the drawings of like parts to see if any of them can be used.

Simple Valve Lifter Made from Scrap Parts

BY EDWARD JOHNSON
Cheshire, England

The accompanying sketches show a simple type of valve-spring lifter which, besides being cheap to make, is, so far as my experience goes, the only one that will effectively hold the valve down without trouble while the cotter pin is being removed.

The tool consists of three parts. The upper portion



SIMPLE TYPE OF VALVE LIFTER

is of square steel bar of ⅜ in. section. It is bent as shown in the sketch, so that one end will bear on the valve, while the other end is flattened so that it will enter any link of an ordinary cycle chain. A piece of the latter about 12 in. long is the second part of the tool, while the fork, which is naturally made to suit the type of valve in use, is forged from a piece of ¾-in. round steel bar. One end of this bar is forked, and near to the fork it is flattened so that it will pass between the links of the chain. Through the flattened part a hole is drilled to accommodate the ordinary joint bolt of the chain.

Stock Gage for a High-Speed Press

BY S. A. MCDONALD

A large variety of stock gages are used on punch press work, the most familiar being the stationary gage located in the die as shown in Fig. 1. The simplicity of its construction is its strongest point of advantage. However if the press is to be run at high speed and continuously, the operator may find it impossible to lift the stock over the gage and relocate it properly before the punch comes down.

The gage shown in Fig. 2 was designed to use on combination dies for making boxes for shoe polish of varying sizes, which were punched at the rate of 135 per minute.

It is constructed as follows: The bracket *A* is bolted to the side of the press and contains the sleeve *B*, held in place by a shoulder and the nut *C*. The large end of the sleeve is split and has the clamp bolt *D* which clamps the adjusting rod *E* in position. The gage stop *F* is adjustable in the adjusting rod and is clamped in position by the screw *G*. The spring *H*, connecting the pin *I* in the bracket with the pin *J* in the sleeve, keeps the gage on the die under tension. The stud *K* in the sleeve *B* is bent parallel to the sleeve and has the connecting rod *L* located on it by the two collars *M*. The upper end of the rod *N* has a slotted

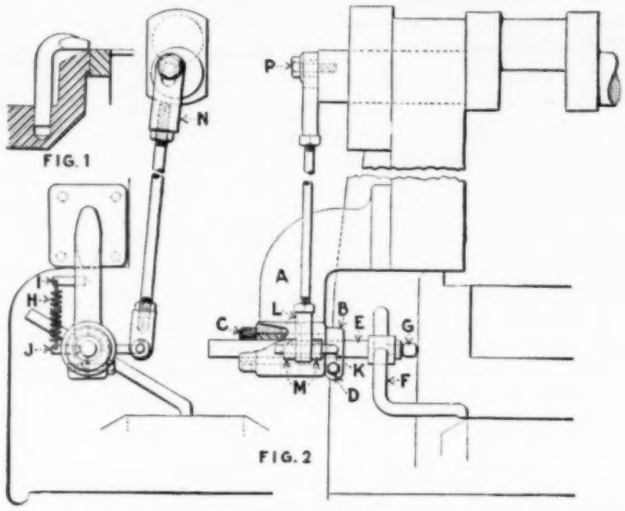


FIG. 1—STATIONARY STOCK GAGE. FIG. 2—STOCK GAGE FOR HIGH-SPEED PRESS

hole through which it is attached to the crank shaft by the bolt *P*. The bolt hole is so located that as soon as the punch leaves the die the gage is lifted up and before the punch reaches the top of its stroke the gage is down on the die again. By means of adjusting nuts, the amount of lift of the gage is reduced to a minimum so that the stock can be fed just past the gage before it comes down again, leaving the maximum time for relocating the stock. This gage is used on a number of dies whose diameter and height vary, and it can be set accurately for lithographed tin.

Moving Gas-Engine Flywheels—Discussion

BY J. T. TOWLSON
London, England

Upon reading the article under the above title by E. V. Allen, published on page 559, Vol. 58, of the *American Machinist*, describing his method of transporting the flywheels of gas engines, I am reminded of a similar procedure applied with respect to the moving of steam-engine flywheels of much greater diameter and weight. These wheels were 12 ft. in diameter and weighed about 8 tons each, being built-up wheels consisting of six segments with corresponding spokes and a hub, or boss.

The wheels were built in a small shop which, though possessing a good and heavy flywheel lathe, could not boast of much in the way of tackle equal to the task of lifting the heavy weights. The wheels were built up, segment by segment, in the lathe, and when the turning was completed they were dismantled in the same manner and reassembled for transportation to the distant engine room in which they were to be erected.

The assembled wheels were raised upright (upon their rims) and a turned log of wood 9 in. in diameter was passed through the bores of the two wheels. Wood battens, nailed to the log between the hubs, spaced the wheels about 12 ft. apart and similar battens outside the hubs kept them from working off the log.

To pull the wheels along, a light road engine was pressed into service, being attached by means of chains of considerable length to the outer ends of the log while a strut about 13 ft. long held the two leads of the chain apart so that they were clear of the wheel rims and could not rub them.

The distance the wheels were to be moved was about 4 miles, but as the road was fairly hard and level no difficulty was experienced in getting them to their destination.

Laying Out Work for Drilling

BY G. W. NUSBAUM

A die blank from which it is desired to cut a square is shown in Fig. 1. The usual method is to lay out the square to be cut, select the size drill which is to be used, set the dividers to the diameter of the drill and then lay out the centers of the holes to be drilled. This is a satisfactory method if time and tedious work are not factors to be considered. There is also another method frequently used, which is to employ a spacing device on a center punch, but by the use of a few easily made tools most of this lay-out work may be avoided.

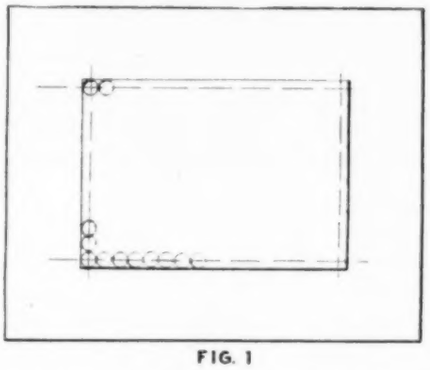


FIG. 1

FIG. 2

FIGS. 1 AND 2—LAYOUT TOOL AND METHOD OF USING IT

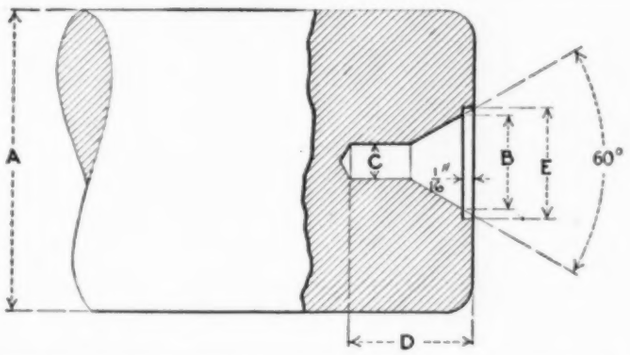
With a set of tools, as shown in Fig. 2, starting with a $\frac{1}{16}$-in. circle, each tool increasing by $\frac{1}{16}$ in. on the diameter, a complete chain of centers with the proper circle circumscribed about each one can be marked on the work with unusual rapidity. In addition to the speed of layout attained, much tedious work is eliminated, for it is only necessary to match the edge of the tool against a circle and a line previously made on the work, and then to give the tool a light blow with a hammer.

A parallel strip may be clamped to the work to guide the tool parallel to the layout and thus further reduce the tedium of the work.

Dimensions of Reamed Centers

BY CLARENCE D. SCROM

Herewith is a table giving dimensions of centers for boring bars, reamers, arbors, etc. The table has gone a little farther than ordinary tables of the kind by providing for a counterbored recess to prevent the centers from getting burred up in use. The column giving the decimal sizes of the drills enables the workmen to use such drills in place of those designated by letters or numbers. The table was made for use in our toolroom.



Dia. of Work A	Largest Dia. of Center B	No. of Drill C	Dec. of Drill	Depth of Hole D	Counter Bore E
$\frac{1}{8}$	$\frac{1}{8}$	55	0.0520	$\frac{1}{32}$	$\frac{3}{16}$
$\frac{5}{16}$	$\frac{3}{32}$	52	0.0635	$\frac{1}{8}$	$\frac{3}{16}$
$\frac{3}{8}$	$\frac{3}{16}$	48	0.0760	$\frac{3}{32}$	$\frac{3}{16}$
$\frac{7}{16}$	$\frac{7}{32}$	43	0.0890	$\frac{5}{16}$	$\frac{11}{32}$
$\frac{1}{2}$	$\frac{1}{4}$	39	0.0995	$\frac{3}{8}$	$\frac{3}{8}$
$\frac{9}{16}$	$\frac{9}{32}$	33	0.1130	$\frac{13}{32}$	$\frac{13}{32}$
$\frac{5}{8}$	$\frac{5}{16}$	30	0.1285	$\frac{7}{16}$	$\frac{7}{16}$
$\frac{11}{16}$	$\frac{11}{32}$	29	0.1360	$\frac{15}{32}$	$\frac{15}{32}$
$\frac{3}{4}$	$\frac{3}{8}$	25	0.1495	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{13}{16}$	$\frac{13}{32}$	20	0.1610	$\frac{9}{16}$	$\frac{17}{32}$
$\frac{7}{8}$	$\frac{7}{16}$	17	0.1730	$\frac{17}{32}$	$\frac{9}{16}$
$\frac{15}{16}$	$\frac{15}{32}$	12	0.1890	$\frac{5}{8}$	$\frac{19}{32}$
1	$\frac{1}{2}$	8	0.1990	$\frac{21}{32}$	$\frac{5}{8}$
$1\frac{1}{16}$	$\frac{33}{64}$	5	0.2055	$\frac{11}{16}$	$\frac{41}{64}$
$1\frac{1}{8}$	$\frac{17}{32}$	3	0.2130	$\frac{23}{32}$	$\frac{21}{32}$
$1\frac{3}{16}$	$\frac{35}{64}$	2	0.2210	$\frac{25}{32}$	$\frac{43}{64}$
$1\frac{1}{4}$	$\frac{9}{16}$	1	0.2280	$\frac{3}{4}$	$\frac{11}{16}$
...	...	Letter	.....	...	...
$1\frac{5}{16}$	$\frac{37}{64}$	A	0.234	$\frac{25}{32}$	$\frac{23}{32}$
$1\frac{3}{8}$	$\frac{19}{32}$	B	0.238	$\frac{25}{32}$	$\frac{23}{32}$
$1\frac{7}{16}$	$\frac{39}{64}$	C	0.242	$\frac{13}{16}$	$\frac{47}{64}$
$1\frac{1}{2}$	$\frac{5}{8}$	E	0.250	$\frac{13}{16}$	$\frac{3}{4}$
$1\frac{9}{16}$	$\frac{41}{64}$	F	0.257	$\frac{27}{32}$	$\frac{25}{32}$
$1\frac{5}{8}$	$\frac{21}{32}$	G	0.261	$\frac{7}{8}$	$\frac{25}{32}$
$1\frac{11}{16}$	$\frac{43}{64}$	H	0.266	$\frac{29}{32}$	$\frac{13}{16}$
$1\frac{3}{4}$	$\frac{11}{16}$	J	0.277	$\frac{29}{32}$	$\frac{13}{16}$
$1\frac{13}{16}$	$\frac{45}{64}$	K	0.281	$\frac{15}{16}$	$\frac{27}{32}$
$1\frac{7}{8}$	$\frac{23}{32}$	L	0.290	$\frac{31}{32}$	$\frac{27}{32}$
$1\frac{15}{16}$	$\frac{47}{64}$	M	0.295	$\frac{31}{32}$	$\frac{29}{32}$
2	$\frac{3}{4}$	N	0.302	1	$\frac{7}{8}$
$2\frac{1}{16}$	$\frac{49}{64}$	N	0.302	$1\frac{1}{32}$	$\frac{27}{32}$
$2\frac{1}{8}$	$\frac{25}{32}$	O	0.316	$1\frac{1}{32}$	$\frac{29}{32}$
$2\frac{3}{16}$	$\frac{51}{64}$	O	0.316	$1\frac{1}{16}$	$\frac{29}{32}$
$2\frac{1}{4}$	$\frac{13}{16}$	P	0.323	$1\frac{1}{16}$	$\frac{15}{16}$
$2\frac{5}{16}$	$\frac{53}{64}$	Q	0.332	$1\frac{1}{8}$	$\frac{31}{32}$
$2\frac{3}{8}$	$\frac{27}{32}$	R	0.339	$1\frac{1}{8}$	$\frac{31}{32}$
$2\frac{7}{16}$	$\frac{55}{64}$	R	0.339	$1\frac{1}{8}$	$\frac{63}{64}$
$2\frac{1}{2}$	$\frac{7}{8}$	S	0.348	$1\frac{3}{16}$	1
$2\frac{9}{16}$	$\frac{57}{64}$	T	0.358	$1\frac{3}{16}$	$1\frac{1}{64}$
$2\frac{5}{8}$	$\frac{29}{32}$	T	0.358	$1\frac{3}{16}$	$1\frac{1}{32}$
$2\frac{11}{16}$	$\frac{59}{64}$	U	0.368	$1\frac{1}{4}$	$1\frac{3}{64}$
$2\frac{3}{4}$	$\frac{15}{16}$	V	0.377	$1\frac{1}{4}$	$1\frac{1}{16}$
$2\frac{13}{16}$	$\frac{61}{64}$	V	0.377	$1\frac{1}{4}$	$1\frac{3}{64}$
$2\frac{7}{8}$	$\frac{31}{32}$	W	0.386	$1\frac{5}{16}$	$1\frac{1}{32}$
$2\frac{15}{16}$	$\frac{63}{64}$	X	0.397	$1\frac{5}{16}$	$1\frac{7}{64}$
3	1	X	0.397	$1\frac{5}{16}$	$1\frac{1}{8}$

TABLE OF REAMED CENTER DIMENSIONS

American Machinist
Established 1877
KENNETH H. CONDIT AND FRED H. COLVIN
Editors

August 2, 1923

Unserviceable Locomotives Become Fewer

THE report of operating statistics of Class I railroads to the Interstate Commerce Commission for June shows a steady decrease in the number of unserviceable locomotives, both passenger and freight. Considering this achievement in view of the record movements of freight cars during the last few weeks we must agree that the railroads have done a remarkable job.

If we also consider the handicaps in the way of poor tools and inadequate equipment with which the mechanical departments have to struggle, the fact that unserviceable freight locomotives have dropped from 26.1 to 22.9 per cent, and passenger from 24.4 to 21.3 per cent is much more remarkable.

The shop executives and the men under them deserve a lot of credit for what they have accomplished but can we say the same for those responsible for the poor shop equipment with which the mechanical department has to work?

Thoughts on Reading the Entries For the Equipment Replacement Contest

WE HAD rather expected it would be an arduous task to wade through all the entries to the "It Pays to Replace" contest. Strange to relate it turned out to be quite the reverse. Not only were many of the stories good reading in themselves but the wide variety of subjects covered drove away any tendency toward boredom.

It was quite clear that the mechanical men who wrote of changes for the better made under their direction or at their suggestion, realized that appreciable savings can be made by the use of the most modern small tools and handling equipment as well as by the installation of first class up-to-date machine tools. The suggestions ran from oxyacetylene cutting and welding to the replacement of an ancient railroad transfer platform by a traveling crane.

In size the tools mentioned ranged from wire-forming machines to big station-type automatics. The product was anything from a small part of a hand numbering machine to iron disks that would just go on a big boring mill.

All in all, the quality and number of entries exceeded expectations and the only regret is that every entrant could not win a prize.

We could not help but be struck by one thought that ran through many of the stories, the difficulty of persuading the man who held the pursestrings to loosen up. Entrant after entrant told of his long struggle with the boss to get him to retire some worn-out, obsolete piece of junk and replace it with a real tool that would earn its cost in a few months.

Conservatism is well enough in its place but it can be overdone, particularly when it means the needless expenditure of time and money in making things with inadequate equipment. The American manufacturer has the reputation of having the nerve and business acumen to scrap old equipment when better tools for his purpose appear. Undoubtedly some of our leading manufacturers have earned this reputation but there are certainly many today who do not merit it in the least.

If they would only listen to the pleas of their foremen, superintendents and managers how much more prosperous they would be and how the industry as a whole would forge ahead. As one contributor pointed out, sentiment in the treatment of men who have put in a lifetime of faithful service is one thing, but something quite different where a worn-out machine is concerned.

The Weakest Link— The Milling Cutter

EVERYONE knows the old truism about the chain being no stronger than its weakest link. The trouble, however, is that most of us think of it only in connection with chains.

Perhaps the milling machine is as good an opportunity as any to apply the weakest link in theory, but how many do so? We buy a big husky milling machine, in our judgment the very best made, and boast about its cost. But when it comes to cutters for this same machine, it is too often a different story.

When it comes to weak links, the milling cutter is a good example and this includes design, material and sharpening. It is practically safe to say that a majority of the heavy duty milling machines of today are not doing all they should, because of the lack of knowledge concerning milling cutters.

"Cutters is cutters" in too many cases, and price alone controls their purchase. And so we find many fine machines, nibbling away at work instead of pulling out the chips as they should. The owner is disappointed at not getting the production he expected while the milling machine builder frequently knows nothing at all about it.

This is not a criticism of quality of milling cutters so much as of their not being adapted to their work. In these days of heavy duty milling, each job frequently presents a real engineering problem of cutter design and construction. A milling cutter which is to absorb the pull of a 15 or even 25 hp. motor is a very different proposition from the milling cutter of ten years ago. The day of ordering cutters from a catalog doesn't fit this kind of work.

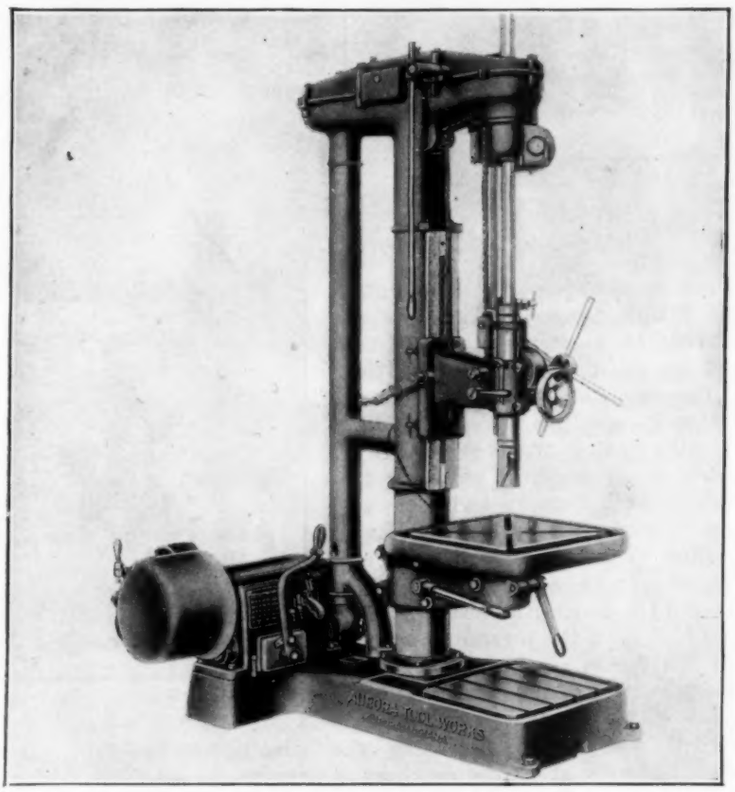
The milling cutter makers who are getting best results are those who study the work in hand. They send cutter engineers instead of the small tool salesman of the older type, and buyers who are wise have to forget the first cost and count on the work done per dollar of investment. But there are still many shops where the fine, high-powered milling machine is doing about half the work it should because the manager hasn't applied the "weakest link" story.

Shop Equipment News

Aurora Ball-Bearing Upright Drill

A ball-bearing upright drill, designated as the "Super 28 in.," is just being introduced by the Aurora Tool Works, Aurora, Ind. The main feature of the machine is its built-in construction, in which all moving parts, with exception of spindle and feed rod, are inclosed.

The main column, 8½ in. in diam., is bolted to the base which has a stationary work table at the front and carries the speed box and belt pulleys at the rear. The speed box speed is 450 r.p.m. and the tight belt pulley is 12 in. in diameter with a 4¼ in. face. When equipped for motor drive, the motor is mounted on the speed box. The loose pulley is fitted with an oilless bearing and is smaller than the tight pulley to slacken the belt when idling.



AURORA BALL-BEARING UPRIGHT DRILL

All speeds and feeds are plainly designated and may be obtained without stopping the mechanism. The helical spur gears are made from nickel alloy steel with 20-deg. stub teeth. Two sets of back gears are built in and, in combination with these, the speed box will furnish 16 spindle speeds ranging from 37 to 500 r.p.m. Six feeds are available from 0.007 to 0.046 in. per revolution of spindle. The vertical drive shaft passes up through the tubular back brace.

The spindle is forged from high-carbon steel, is double-splined and fitted with ball thrust bearings. Its diameter in the sleeve is 1⅛ in. and the hole fits No. 4 Morse taper. The drilling head slides on ways attached to the main column through a total movement of 24 in. and provides a maximum distance of 49 in. from spindle to base.

The table of the drill is carried on the main column and is raised and lowered by a hand-operated rack and pinion. The maximum distance from spindle to table is 33¼ in. and the table may be swung out of the way to allow work to be placed on the base. The diameter of the plain round table is 25 in. and a square table, 27x27 in., is furnished.

All bearing and gears are arranged to run in oil and glass gages are fitted to show the oil level in the reservoirs. Ball bearings are used throughout the machine except in the quill.

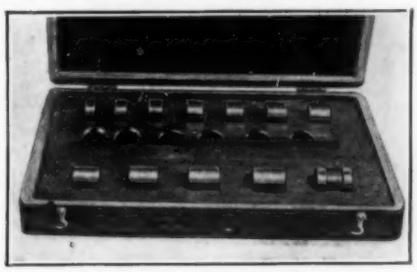
Controls, including table clamping handles, are so arranged that they may be operated from the front of the machine. Protection of vital parts from foreign matter and increased safety for the operator are among the advantages claimed for the built-in construction of the machine.

A friction tapping attachment can be furnished, and the height with this attachment in place is 9 ft. 3 in. The extreme height with spindle extended is 11 ft. The machine weighs 3,410 lb. and requires 62½x40¼ in. floor space.

Van Keuren Fractional Reference Gage Set

An addition to the line of reference gages manufactured by the Van Keuren Co., 362 Cambridge St., Allston, Boston, Mass., is a set of fractional reference gages which is now being marketed.

This set includes the fractional inch or common shop sizes. It consists of eighteen gages varying in sixteenths from $\frac{1}{16}$ to 1 in. and including the $\frac{33}{64}$ and $\frac{49}{64}$ in. sizes.



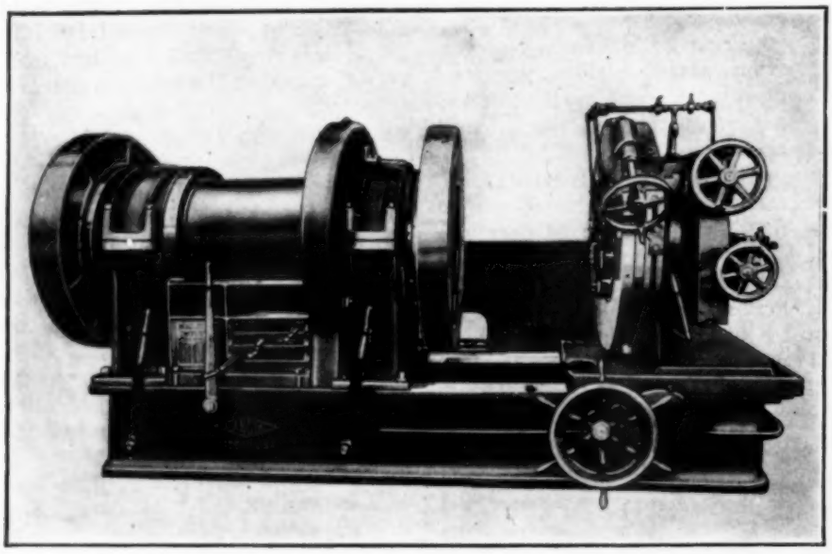
VAN KEUREN FRACTIONAL REFERENCE GAGE SET

The gages are particularly useful as a reference standard for measuring steel balls and other products where the standard sizes are fractional inch dimensions.

A Bureau of Standards certificate of accuracy is furnished with the set.

Landis 18-Inch Pipe Threading and Cutting Machine

The Landis Machine Co., Waynesboro, Pa., has added to its line of pipe threading and cutting machines an 18-in. size. The range of this machine is from 8 to 18 in. and this entire range is covered by one diehead and one set of chasers. The design is similar to that of the 12-in. size, illustrated and described on p. 349, Vol. 56 of *American Machinist*.



LANDIS 18-INCH PIPE THREADING AND CUTTING MACHINE

The length of the machine is 12 ft. 6 in. and the height is 6 ft. The extreme width of the belt driven machine over the belt pulley is 5 ft. 10 in., while the extreme width of the motor driven machine over the motor plate, is 6 ft. 8 in. It weighs 22,000 pounds.

The machine has a single pulley drive and the variations in speeds, which are eight in number, are obtained by means of a speed box located beneath the main spindle. A friction clutch is mounted on the main drive shaft with the pulley or, if driven by an electric motor, a chain sprocket will be substituted for the pulley. The operating cone of the clutch is moved by two levers which are located at the ends of the headstock within easy reach of the operator. The forward lever is used when threading pipe, and the lever at the rear end of the machine is used for starting and stopping when making up flanges. The lever in the middle is for reversing and is placed convenient to the operator.

All gears are fully enclosed and, with the exception of the main driving gear and its pinion, they run in an oil bath. The main bearings of the hollow spindle are lubricated by flat link chains which run in oil contained in large reservoirs in the base. The driving pinion shaft, as well as the reverse shafts, is lubricated by sight feed oilers.

At each end of the hollow spindle there is a 3-jaw independent chuck for holding the pipe. The rear chuck is equipped with flange grips for fitting flanges. The jaws are geared, have universal adjustment and are self-centering on the pipe.

The carriage which supports the diehead, the cutting-off tool, and the reaming tool is traversed either by power or by hand. The power traverse is both forward and backward, and is controlled by a lever located on the operating side of the carriage. To advance the carriage toward the chuck, the lever is pulled and held until the threading position for the die is reached. To reverse the movement of the carriage, at any point within its travel, the lever is pushed and held. Releasing the lever instantly stops the carriage at any point.

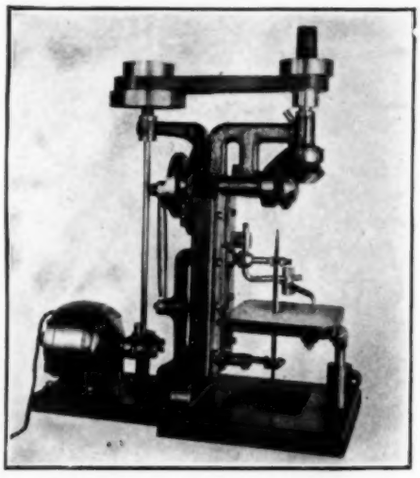
Automatic stops prevent the diehead from coming in contact with the chuck in the forward movement, and the carriage from running off the guides of the machine in the backward movement. The reaming tool is quickly set to position and locked with a lever. It is fed to the pipe by rotating the cutting-off feed handwheel in a counter-clockwise direction.

The machine is converted to motor drive by replacing the pulley with a sprocket and mounting the motor on a base over the gear box. A silent chain is employed to drive from the motor to the sprocket. This machine employs the Landis long life tangential chaser.

Flint Filing Machine

A filing machine which presents some interesting features is now being introduced by the Flint Manufacturing Co., 1016 Merrill St., Flint, Mich. The general design of the machine will be evident from the accompanying illustration.

Various sizes and shapes of standard files may be clamped on projections from a crosshead which slides in suitable guides on the frame. The crosshead is given a reciprocating movement by a crank on a horizontal shaft above the work table. This shaft is driven by means of bevel gears from a short vertical shaft which is, in turn, belt-driven from the vertical shaft geared to the motor. Ball bearings are used and a feature of the machine is that the bearings are above the work and away from the file dust. Three-step cone pulleys are provided for changing the speed.



FLINT FILING MACHINE

The stroke of the file is adjustable to all distances up to 5 in. and the work table is adjustable about two axes. A universally adjustable work clamp is provided.

In addition to the motor-driven machine shown, a belt-driven machine and one adapted to be placed on a drill press table and operated by the spindle, are manufactured.

Cochrane-Bly Metal Sawing Machine

The Cochrane-Bly Co., St. James St., Rochester, N. Y., has recently placed on the market a cold sawing machine having sufficient capacity for cutting 13-in. round, 12-in. square, or 10 x 15-in. rectangular sections.

As shown in the accompanying illustration, the bed of the machine is set in a deep pan which catches the oil and chips and drains into a reservoir from which a geared pump recirculates the oil. The saw carriage is carefully fitted to the bed and carries the hardened and ground saw arbor in a solid bearing.

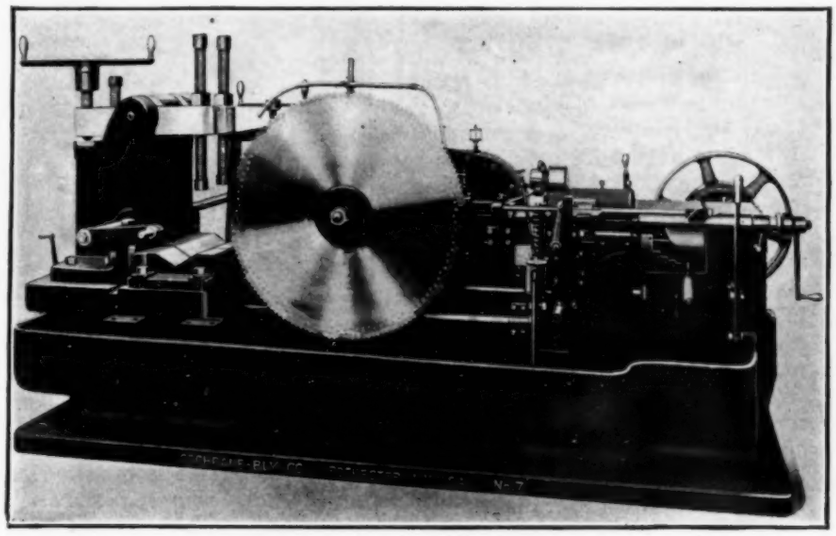
The feed screw is directly in line with the center of the saw arbor and as close to the line of the saw as possible. The feed-screw nut is split and adjustable in an endwise direction to remove lost motion from the screw. Between the screw and gear box, the lost motion is taken up by hardened steel nuts. The screw is driven through a combination of worm and spur gears which allow eleven changes of feed. The feed may be started, stopped or reversed by suitable levers at front and back of machine. The carriage can also be adjusted to or from the work by cranks at either end of the machine.

The friction clutch pulley which drives the machine is 24 in. in diameter with 9-in. face and is mounted on the drive shaft which runs in ring-oiling bearings. This clutch is also controlled through levers at front and back of machine.

Three cutting speeds, 30, 40 and 50 ft. per min., are available and changes are made through a gear box operated by a lever on the box. All gears except the worm gears are of steel and run in oil. The worm is hardened steel and is furnished with a ball thrust bearing.

The regular vise shown has two hand-operated clamping screws, but a vise operated by compressed air can be furnished. A crank-operated feeding mechanism is installed, and through suitable gearing the operator can, it is said, easily adjust a 12- by 12-in. billet in the vise.

The diameter of the saw is 37 in. and its thickness 9/32 in. The speed of the drive shaft required is 300 r.p.m. and a 20 hp. motor should be used. The floor space for belt drive is 71 x 129 in., and for motor drive, 89 x 129 in. The net weight of the machine is 12,600 pounds.



COCHRANE-BLY METAL SAWING MACHINE

John-Sons Gage Vise and Fixture

For use in connection with the John-Sons adjustable thread snap gages, the John-Sons Gage Works, 67 Blue Hills Ave., Hartford, Conn., has recently developed a gage vise and fixture which are shown in the accompanying illustrations.

The vise is illustrated in Fig. 1 and can be used with any size or style of John-Sons thread snap gage. The structure is rigid and the gage is clamped in position by a collar-head screw.

The fixture is used with any John-Sons thread gage for work larger than 2 in. in diameter and is shown in Fig. 2. The finished portion of the base upon which the work slides is a hardened steel plate, ground after being fastened to the base. An arrangement of springs in the stem leaves the gage free to float up and down above the plate, and the position of the gage above the plate is regulated by an adjusting bolt projecting through a hole in the handle. The stem also projects through the threaded bushing and handle and guides the gage so that it always remains parallel to the base.

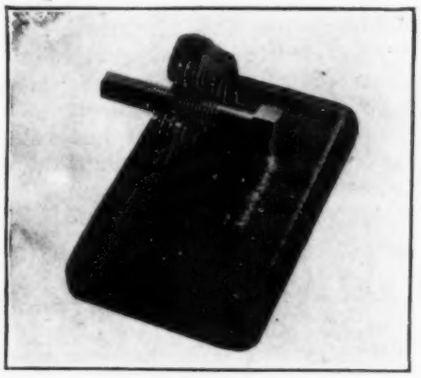


FIG. 1—JOHN-SONS GAGE VISE

This arrangement eliminates the tendency to cross threading, and the freedom of movement vertically permits alignment between gaging rolls and the thread to be gaged. By giving the work a quarter turn and regaging it, an out-of-round thread is detected, and a tapered thread is shown by raising or depressing the gage. When released, the gage returns to its normal position.

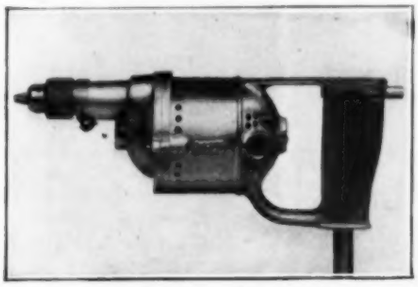
FIG. 2—JOHN-SONS GAGE FIXTURE

It is stated that the practicability of this fixture has been proven under actual working tests and that its use leads to speedier and more accurate work.

U. S. Automatic ¼-Inch Electric Drill

A recent addition to the line of electrically driven tools, manufactured by the United States Electrical Tool Co., Cincinnati, Ohio, is an electric drill designated as the "U. S. Automatic" type and designed for drill sizes up to ¼ inch.

The handle is cast integral with the aluminum body and, at its upper end, the switch is located as shown



U. S. AUTOMATIC ¼-INCH ELECTRIC DRILL

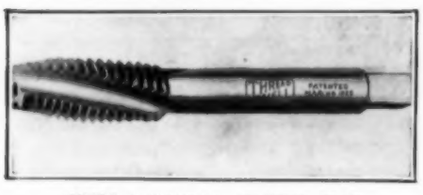
in the illustration. A 3-jaw, screw-back chuck is fitted to the spindle, which is geared to a motor of a type which will operate on d.c. or a.c. circuits. S.K.F. ball bearings are used and the gears are of hardened chrome nickel steel running in grease.

This drill may be made to serve as a grinder, a bench drill or a bracket drill, by the use of other U. S. attachments. The tool weighs 5¾ lb. and its overall dimensions are 10x4 inches.

Wells Spiral Flute Tap

A spiral flute tap has been recently placed on the market by the Wells Corp., Greenfield, Mass.

The spiral flute is the main feature of this tap and many advantages are claimed for it. The action of the right hand spiral curls the chip and cleans it out of the hole. This is an advantage in machine tapping since the tap need not be backed out to loosen the chips. The cutting action of the teeth is improved by the flute as it gives more shearing action at the cutting edge. It is also stated that this design makes the tap especially useful in tapping blind holes on account of its chip-clearing action.



WELLS SPIRAL FLUTE TAP

The ends of the tap are given a double chamfer for easier working, and the edges of the chamfered teeth are rounded over to insure easy starting qualities. The taps will be furnished with threads ground to a tolerance of 0.0005 in. on both lead and diameter if desired.

Hand taps and tapper taps with various shanks are available in standard sizes and threads up to 1 in. in diameter.

Waterbury Farrel Automatic Screw Slotter

The accompanying illustrations show an automatic screw slotter, recently designed and now introduced by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. Three sizes of this machine are built, which are adapted to slot screws with maximum shank diameters, respectively, of ⅞, 1⅛ and 1½ in. The maximum lengths of screws corresponding are 1½, 2½ and 4 inches.

The drive shaft of the machine carries a 4-step cone pulley at the back and a handwheel at the front. It is geared to a cam shaft and belted to the shaft which operates the hopper slide. The hopper slide reciprocates through the blanks in the hopper and loads them into a chute, down which they slide to the indexing dial. Mechanism to insure proper location of blanks in the chute is provided in the hopper.

FIG. 1—WATERBURY FARREL AUTOMATIC SCREW SLOTTER

The dial is shown in Fig. 2, the saw frame having been swung upward so that the dial mechanism may be seen. The blanks are fed to the dial one at a time, and are clamped at the slotting position by a clamping disk which binds against the shank. The dial indexing and locking mechanism is located at the lower end of the dial shaft. A burr-remover, which is a form tool conforming to the shape of the head of the screw, operates to clear off the burr produced in sawing the slot.

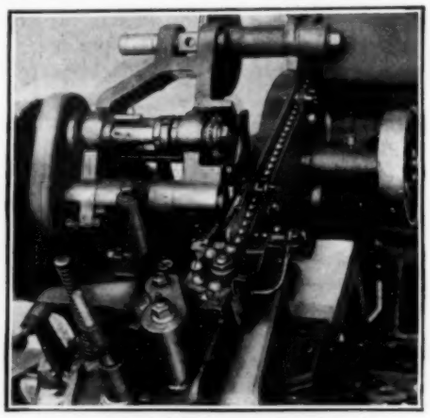


FIG. 2—WATERBURY FARREL SLOTTER FEED MECHANISM

The dial, clamp, saw frame and burr remover are operated from the cam shaft mentioned above.

The saw frame is hinged for convenience in changing saws. Two speeds are available to accommodate high speed or carbon steel saws, and speeds are changed by interchanging the spur gears on the hinge stud and cutter arbor. The depth of cut is adjustable to suit the screw, and a spring buffer under the saw frame is provided to reduce chatter. In the two smaller size machines the saw is belt-driven, and in the largest it is driven through a chain.

Facility of adjusting and setting up and low operating cost are among the advantages claimed for the machine. A pump, tank and suitable piping for cutting compound are provided. Motor drive will be furnished at an additional charge, if desired, in which case the motor is mounted on the finished pad on the base and drives the machine through a sprocket chain to the drive shaft. For the largest size a 1½-hp. motor is required. This size machine weighs 2,200 lb. and requires a floor space approximately 55 in. square. For the smaller machines ¾ and 1-hp. motors are required and their weights are 900 lb. and 1,550 lb., respectively.

Sundstrand 15-Inch Portable Geared Head Lathe

The 15-in. portable geared head lathe just placed on the market by the Rockford Tool Co., 2402 Eleventh St., Rockford, Ill., will be of interest to railroad shops, shipyards or other shops using such portable equipment. This lathe is patterned after the Sundstrand 14-in. toolroom lathe, a description of which was published on page 315, Vol. 56, of *American Machinist*.

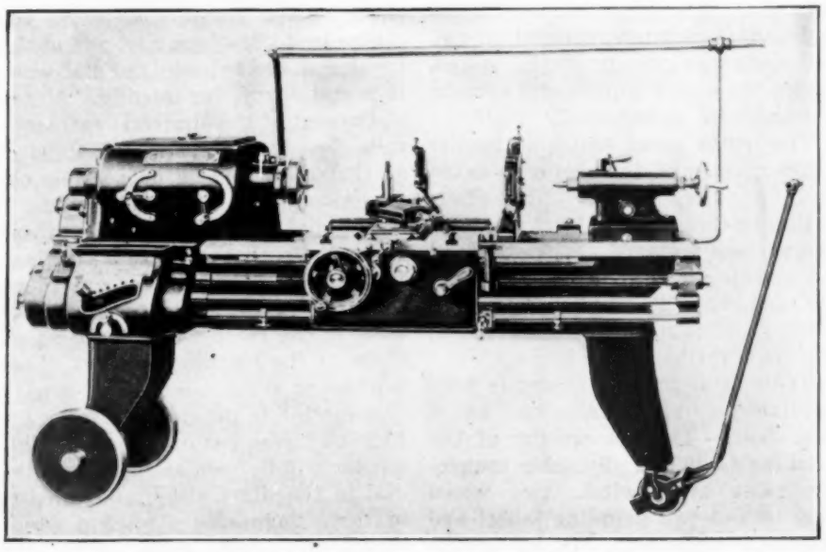
The wheels which provide the portable feature of this lathe are attached to heavy box-section legs at either end of the bed. The headstock end is supported on two wheels through trunnions, and at the other end a single wheel with a suitable fork and steering handle is provided.

The geared headstock is fully inclosed and sliding gears are used. When motor drive is used the motor is mounted directly on the headstock. Speed changes can be made with the machine in motion.

The apron is of double-wall construction and provides sufficient bearings for gears and studs. The threading nut and the longitudinal feed cannot be engaged at the same time. The carriage is provided with felt wipers for cleaning and oiling the ways.

The lead screw has ball thrust bearings at the tailstock end and a threading dial is furnished to facilitate location of previous cuts. The gear box has a tumbler and a cone of eight gears, and 48 thread and feed changes from 1½ to 92 are possible.

This lathe will swing 15 in. over the bed and 8¾ in. over the carriage, and the distance between centers, with 6-ft. bed and tailstock flush with end of bed, is 32 in. For motor drive a 2-hp. motor is required. The usual equipment is provided. The approximate net weight is 2,250 pounds.

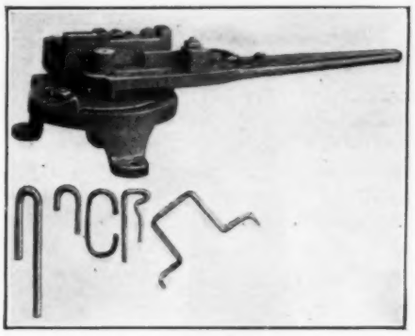


SUNDSTRAND 15-IN. PORTABLE LATHE

Hinman Angle and U Bender

D. A. Hinman & Co., Sandwich, Ill., have recently added an angle and U bender to their line of hand-operated bending equipment. The apparatus, together with samples of bending work accomplished, is shown in the illustration.

The bender is operated by hand and, with regular equipment, is designed to bend round and flat stock to any angle. It will also handle angle iron when one flange is properly cut out at the bending point. With special U-blocks, hooks and Us of various forms can be bent. U-blocks in widths up to 6 in. can be furnished, and also special equipment for U-bends up to 12 in. in width.

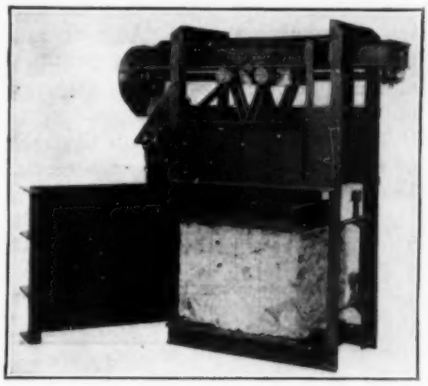


HINMAN ANGLE AND U BENDER

For hot bending the machine will handle flat stock up to 2x2½ in., and for edgewise hot bending, flat stock up to 1¼x⅜ in. The maximum capacity for cold stock is 2x½-in. flats, and ⅞-in. rounds and squares. The weight is about 60 pounds.

Galland-Henning Motor-Driven Toggle Baler

A self-contained motor-driven baling press is now being marketed by the Galland-Henning Mfg. Co., Railway Exchange Bldg., Milwaukee, Wis. The machine is built in two sizes, with corresponding capacities.



GALLAND-HENNING MOTOR-DRIVEN TOGGLE BALER

The principal feature of the pressing apparatus consists of a toggle mechanism, the links of which are operated by two heavy nuts threaded on a large horizontal screw at the top of the machine. The screw is rotated by the motor, which drives it through gearing. There are four toggle levers, mounted in such a way on the nuts and pressing head as to decrease tendency of binding and to keep the parts in proper alignment.

The frame of the machine is constructed of structural steel throughout. The sides of the box are hinged to provide easy access to the finished bale. The frame joints are reinforced with steel castings and forgings and the bearings are fitted with bronze bushings.

The baler will handle paper, rags, leather, rubber and similar materials. The smaller size is shown in the accompanying illustration and will press a bale 36 x 24 x 26 in. The larger size produces a bale 50 x 24 x 26 in. The weights of the machines are 2,500 and 5,500 lb., respectively.

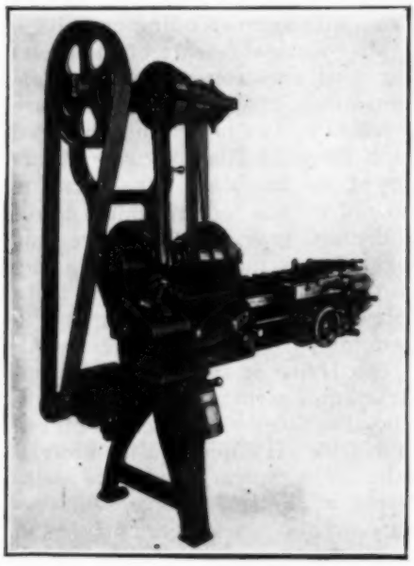
Motor Drive for Carroll & Jamieson Lathes

The Carroll & Jamieson Machine Tool Co., Batavia, Ohio, has recently brought out a motor drive arrangement for use on the line of lathes which it manufactures.

As will be noted from the illustration, a heavy, rigid, vertical bracket is bolted to the back of the lathe bed, and carries at its upper end a hinged frame which supports the countershaft. The countershaft is raised or lowered by a vertical member, which is actuated by an eccentric lever, and swings the frame on its hinge. This vertical movement of the countershaft is to loosen the belt when changing speeds. Adjustments are provided for regulating belt tension and belts can be used until worn out without shortening.

The motor is mounted on the back of the lathe leg by means of a special bracket, and is belted to the countershaft drive pulley by a 2½-in. belt. The upper cone pulley is fitted with a friction clutch which is operated by a convenient lever, and by which the lathe can be started and stopped independently of the motor.

By attaching this drive to a cone head lathe the advantages of a self-contained machine are claimed without excessive first cost. The apparatus is furnished as shown with the exception of motor and switch. A 1½-hp. constant speed motor of about 1,200 r.p.m. is required and can be furnished. It is said that the drive operates with little vibration and causes no misalignment of the lathe.



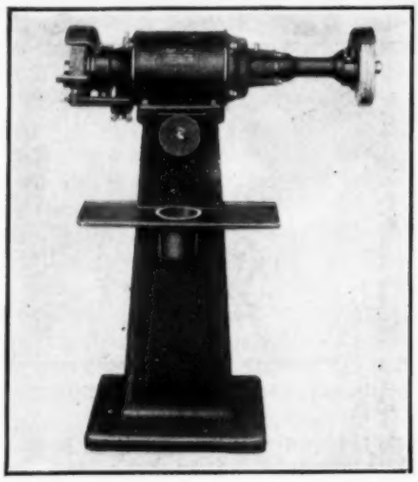
MOTOR DRIVE FOR CARROLL & JAMIESON LATHES

Hisey Motor-Driven Combination Grinder and Buffer

A recent addition to the line of machines manufactured by the Hisey-Wolf Machine Co., Cincinnati, Ohio, is the Hisey motor-driven combination grinder and buffer.

The general design of this machine varies somewhat from previous Hisey machines but the detail construction is patterned after the standard line of grinders and buffers. It is adapted for work requiring the use of a grinding wheel, buffing wheel, wire brush wheel or rotary wire rasp wheel.

The motor is direct connected and is bolted to the top of the floor stand. A suitable base for bench mounting can also be furnished on order. The spindle extension is a separate unit and is connected to the motor armature shaft through a suitable clutch. Each shaft unit is supported on two ball bearings which, it is stated, makes the entire spindle and general construction exceptionally rigid.



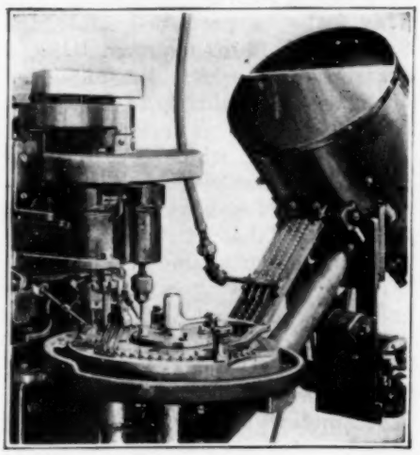
HISEY MOTOR-DRIVEN COMBINATION GRINDER AND BUFFER

The motor speed under no load is 3,500 r.p.m. and the motor is rated at 1 hp. Machines for either alternating or direct current are available for various voltages. The standard a.c. machine is built for 60 cycles but 25- and 40-cycle motors to run at 1,500 and 2,400 r.p.m., respectively, will be furnished on order.

The size of wheel required is 8 in. in diameter, 1½-in. face, and has a ¾-in. hole. The net weight of the machine is 390 lb. Suitable connector cable and switch, two wheel guards and one grinding wheel are standard equipment. Other wheels will be furnished on order.

Hopper Feed for Anderson Dial Tapping Machine

The Anderson Die Machine Co., Iranistan Ave., Bridgeport, Conn., has recently placed on the market a hopper feed for its No. 40 dial tapping machine which was previously described on page 155, Vol. 56, of the *American Machinist*. This arrangement was developed for feeding knurled battery nuts to the machine, and is mounted on a bracket fastened to the under side of the dial pan. It is independently driven by a motor, the independent drive being installed so that the chutes leading from the hopper may be filled before the machine is started.



HOPPER FEED FOR ANDERSON DIAL TAPPING MACHINE

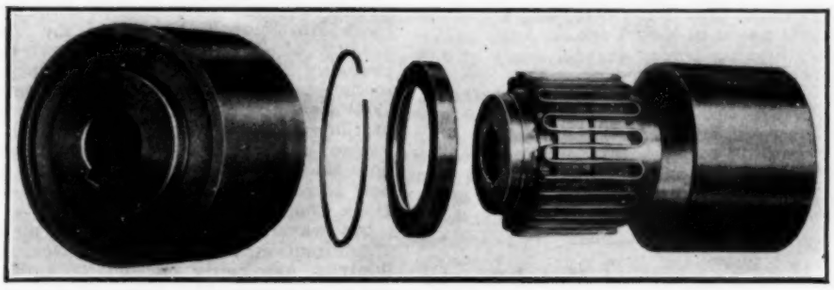
The arrangement of the various parts is indicated in the accompanying illustration. There are three chutes leading from the hopper and a mechanism in the hopper insures proper feeding of the pieces to the chutes. The pieces slide down the chutes by force of gravity, and at the lower end are fed into the dial when it is stationary, for tapping. A stop at the end of the chutes is automatically closed when the dial is stepped, so that there can be no possible obstruction to the dial movement.

The dial ratchet has 18 teeth and for each tooth there are 3 openings in the dial. Three pieces are therefore fed to the dial at each movement of the ratchet and, by using all three of the machine spindles, three are tapped at the same time. A positive ejector is provided to force the finished pieces out of the dial. This ejector will be seen at the left of the dial in the illustration, and consists of three fingers on a bracket which moves up and down with the spindles.

When the machine is timed for 40 strokes per min., the theoretical production is 7,200 pieces per hr. It is stated that three machines, running on a 20 hr. schedule, have tapped up to a maximum of 421,000 pieces per day, which is 97½ per cent of the theoretical production.

Falk-Bibby Flexible Coupling

A flexible coupling for use in all kinds of power transmission equipwhere a coupling is used has been placed on the American market by the Falk Company, Milwaukee, Wis.



FALK-BIBBY FLEXIBLE COUPLING ASSEMBLED AND DISASSEMBLED

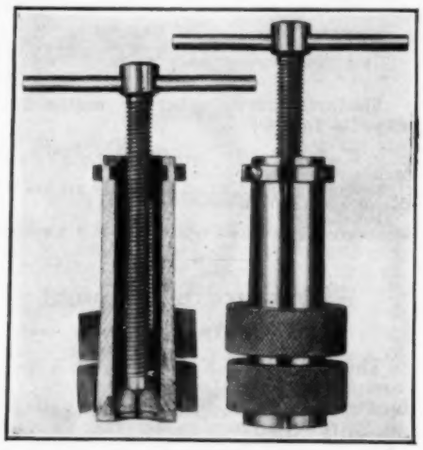
The coupling is known as the Falk-Bibby flexible coupling and is of a type already in extensive use in England, where it is manufactured by the Wellman-Bibby Co., Ltd.

The coupling consists of two flanged steel disks, one to be keyed to each shaft, a tempered steel spring bent into the form of a continuous cylindrical grid, and a steel shell. Pitched cross grooves are cut in the peripheries of the disks, into which the spring is placed. The shell is slipped over the spring to hold it in place and protect it from dirt and injury, and also serves as a container for lubricant. When the shell is in place, end plates are slipped into it and the whole mechanism is locked together by means of clamping rings, which are sprung into grooves in the shell.

The distinctive features of the Falk-Bibby coupling are the form of the spring and the shape of the slots in which it is held. In both flanges the slots widen inwards, so that each section of the spring fits closely only at the outer end of the slot. The sides of the slots are formed to circular arcs of carefully designed radius. Under light and normal load there is a long free span between the points of contact on the springs, but under overloads the spring sections become supported along the curved sides of the grooves, which shortens the span and results in a progressive increase of stiffness with increase of load, while the stress on the spring segments remains constant. The form of construction used allows both torsional and lateral elasticity, which allows for a reasonable amount of misalignment of the shafts. The load is distributed over a large number of spring segments with the result that the pressure on each segment is comparatively light. Other advantages claimed for the coupling are those of convenience in assembling and disassembling, durability and compactness.

Campbell Bearing Puller

The illustration shows an outside view and section of a bearing puller now being marketed by the Campbell Auto Works, 232 N. El Dorado St., Stockton, Calif. This puller is designed for use in removing the inner cones of ball bearings of the open type used on magneto armature shafts and similar electrical equipment.



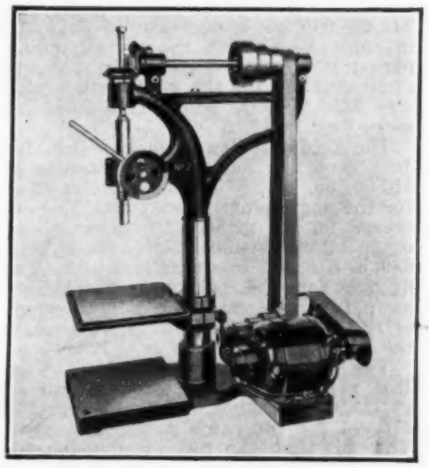
CAMPBELL BEARING PULLER

The tool is made in two sizes and each size is adjustable for different size bearings, without the use of other tools. The adjustment is accomplished by the two taper rings, each of which will adjust for two sizes by reversing it on the jaws. The larger size tool will handle Nos. 14, 15, 16 and 17 bearings, and the smaller size Nos. 8, 10, 12 and 13. The construction and method of operation will be evident from the illustration.

Burke Motor-Driven Heavy Duty Bench Drill Press

The Burke Machine Tool Co., Conneaut, Ohio, has recently added a motor drive to its No. 2 heavy duty bench drill press. The belt-driven machine was previously noted and illustrated on page 499, Vol. 58, of the *American Machinist*.

The construction details and general features of the motor-driven unit are exactly similar to those of the belt-driven machine. The base has been enlarged to provide a pad for attaching the ½-hp. motor which is placed beside the countershaft. The motor drives the countershaft through a Morse silent chain, and a suitable guard for chain and sprockets is provided. Machines with motor drive can be furnished to operate on either direct or alternating current.



BURKE MOTOR-DRIVEN BENCH DRILL PRESS

As previously stated, this machine will drill up to ⅞ in. in diameter at the center of a 12-in. circle. The maximum distance between spindle and table is 10¾ in. and between spindle and base is 18½ in. The motor-driven machine weighs 240 lb., the height is 39 in. and a space 32x12 in. is required.

News Section

Most Railroads Show Gain in June

The general trend of the railroad reports for June made public last week showed an increase, both in comparison with the same month last year and with May. There were exceptions, though, notable among them being the St. Louis-San Francisco.

The report of the Pennsylvania R.R. showed net operating income of $7,938,580, an increase of $2,266,098 in comparison with a year ago. The largest increase was in freight revenues, which totaled $45,636,211, or $11,302,684 more than last year. Compared to an increase of $13,508,043 in the gross operating revenues, the railway operating expenses increased $1,706,294 for June over the same month last year. The greatest increase in expense was registered in the railway operations, where an additional $5,234,840 was spent this year, while maintenance of equipment was second, with an increase of $3,742,646. In June $1,434,099 more was spent on maintenance of structures and ways than in the same month last year.

While June was a favorable month for the Pennsylvania R.R., the net operating income for the first six months was $41,486,060, or a decrease of $279,071 in comparison with the corresponding period last year. Total railway operating revenue for the six-month period was $356,130,371, which is $59,082,728 more than in 1922.

The St. Louis-San Francisco R.R. for June reports a net operating income of $1,506,585, which is $338,401 less than for the same month last year. The decrease is due principally to a falling off in total revenue which was $7,052,830, or $783,495 less than last year. The figures for the half-year period are more favorable, showing a net income of $9,144,231, or $879,747 more than in the same period last year.

The Chicago, Milwaukee & St. Paul R.R. reported net operating income of $1,311,981 for June, compared with $1,215,104 for the same month last year. This brought the net income for the first half of this year up to $6,669,014, compared with $1,617,154 last year, an increase of $5,051,859.

Net income of the Central Railroad of New Jersey was $587,970, compared to a deficit of $112.158 for the same month last year. This brings the net income for the first six months up to $2,516,568, against $1,681,722 in the same period of last year.

Considering Twelve-Hour Day Elimination

Elbert H. Gary, chairman of directors of the United States Steel Corp., reported that progress was being made in evolving a plan calling for the elimination of the twelve-hour day in the steel industry. Several conferences of subsidiary company presidents were held in the office of Judge Gary last week, and the directors of the American Iron and Steel Institute discussed the matter at a meeting held in the Metropolitan Club on Friday. Following a recent meeting of steel corporation executives, Judge Gary said that both meeting have been postponed until next Aug. 2.

When asked to comment on the situation, Judge Gary said:

"Both meetings have adjourned to meet again in New York on Aug. 2. We are making a very careful study of the whole subject concerning the elimination of the twelve-hour day. I should say we are making very satisfactory progress, but have not proceeded far enough to express any opinion as to the final conclusion. I suppose when the consultations are finished I may make some statement."

June Exports of Metal-Working Machinery

Exports of metal-working machinery during June, 1923, with revised comparative figures for June, 1922, as compiled from the returns to the Department of Commerce, were as follows:

	1922 Value	1923 Value
Lathes	$82,198	$96,385
Boring and drilling machines	68,580	44,710
Planers, shapers and slotters	52,220	26,855
Bending and power presses	31,531	10,703
Gear cutters	15,937	9,971
Milling machines	51,622	34,830
Thread cutting and screw machines	17,290	36,384
Punching and shearing machines	20,685	14,890
Power hammers	31,162	7,158
Rolling machines	585	485
Sharpening and grinding machines	69,297	72,034
Chucks (centering, lathe, drill and other)	11,605	24,344
Reamers, cutters, drills and other parts for machine tools	110,007	182,433
Pneumatic portable tools	30,687	64,896
Foundry and molding machinery	53,447	28,246
Other metal-working machinery and parts of	821,953	370,627
Total metal-working machinery	$1,444,806	$1,026,951

Similar figures covering motor car exports follow:

	1922 Value	1923 Value
Automobiles and chassis (total)	$6,652,519	$10,130,183
Motor trucks and busses (except electric)		
Passenger cars, except electric	5,807,426	8,971,827

Will Improve Terminal at Madison

The Chicago & Northwestern R.R. is completing plans for terminal improvements at Madison, Wis., and has planned to start construction by the first of October. The plans call for a general machine shop 75x120 ft; a steam generating plant; a 100-ft. cinder pit with electric hoist; a 24-stall roundhouse; a 200-ton coal house; and a turntable. This road has also prepared plans for the construction of a new coal hopper at Milwaukee.

Engineers Studying Coal Problems

Definite organization of engineering committees throughout the country for the purpose of guarding against a shortage of coal this Winter, which threatens to become acute, was announced recently by the President of the F.A.E.S. Dean Mortimer E. Cooley of the University of Michigan. The engineers, probably 200,000 of them, are working in conjunction with the United States Coal Commission and the Department of Commerce.

One hundred and seven committees now are actively pursuing the study of how to solve the Nation's fuel problem, Dean Cooley said.

As was done during the war under the direction of Herbert Hoover, industries are being classed as preferential and desirable; these to get first call on the coal in hand. Among the former are electric railways, light and power, gas, steam railways, steel mills, smelters, autos and accessories, electrical equipment, railway equipment, cotton ginning, textile, paper and pulp, packing houses, flour mills, sugar, glucose and starch, office buildings, hotels, publicly owned buildings, schools and hospitals, dock and pier storage, coal dealers and navy and merchant marine.

Instructing Employees in New Way

A strong plea for the education of industrial employees in the fundamentals of business economics and in the details of the businesses in which they are employed is made by Carl F. Dietz, president of the Bridgeport Brass Co., Bridgeport, Conn., in a pamphlet recently issued by the Fabricated Production Department of the Chamber of Commerce of the United States.

The methods employed by Mr. Dietz's company are unique. Employees are educated through lectures and by means of simple visual illustrations. In the place of charts and graphs blocks of colored wood are used.

Workers who perform certain operations on materials before they have reached an advanced stage towards completion often show little interest in their work because they never see the start and finish of the job on which they are employed. There is manifest at all times, declares Mr. Dietz, a real desire on the worker's part to know more about the business in which he is employed. Far seeing managers, he adds, are seeking the best methods of imparting such information constructively, and especially information regarding the relation of production to wages and the distribution of the dollar received for the product of the plant.

Copies of the booklet may be obtained by addressing the Chamber of Commerce of the United States, Washington, D. C.

Chicago Workers Busy on Unfilled Orders

Machine tool dealers in the Chicago district report business as quiet, but attribute the lack of business to be due principally to the vacation period. There has been no new activity in the railroad situation this week, and industrial buying continues to be slow.

The Pennsylvania R.R. has made inquiry for a 36-in. punch, a 36-in. shear, a 5-ft. radial drill and a 4-ft. radial drill. The Virginian R.R. is in the market for a 32-in. shaper, a pipe machine, a sensitive drill press, a 32-in. crank planer, and 21-in. and 25-in. lathes. The Seaboard Air Line R.R. has entered the market for a 36-in. and 60-in. punch, and a 36-in. and a 60-in. shear. The Atlantic Coast Line R.R. has issued an inquiry for a 300-ton hydraulic bulldozer.

The last week has brought no developments indicating the trend of the machine tool industry over the next few months. There is a fair degree of optimism in the trade, but this is coupled with the fact that there is also a great deal of uncertainty in every one's mind as to just which way the market will drift in the next few months.

The general weakness in the steel market continued with slight change for the better last week. Railroad buying of cars and locomotives which figured largely during the early part of the year, has fallen to a low point, with the future course depending upon price fluctuations. Car builders in the Chicago district have work on hand for the next three or four months.

Production keeps up at a high rate for this time of the year and shipments are going forward to contract consumers without let-up. There are virtually no requests of importance for suspension of shipments, while some consumers, particularly the railroads, are pressing for deliveries to complete work on hand.

Freight Car Performance at Record Peak

The railroads of the United States on July 14 had 84,210 surplus freight cars in good repair and immediately available for service if transportation conditions warranted, despite the fact that for the week which ended on that day a total of 1,019,667 freight cars were loaded with revenue freight, the second largest number for any one week in the history of the country. The previous record loading was established during the week which ended on June 30 when the total was 1,021,770 cars, and on which date there were 63,636 surplus freight cars. When the previous freight loading record was made during the week of Oct. 14, 1920, the total for which was 1,018,539 cars, there were only 2,188 surplus freight cars, while there was a shortage of 69,517 freight cars.

The total number of surplus freight cars on July 14 was an increase of 20,143 cars over the number on July 8. Surplus box cars in good repair numbered 64,692, an increase within a week of 21,771, while surplus coal cars numbered 4,865, an increase of 245 within the same period. Surplus refrigerator cars totaled 8,074, an increase of 70 over the total number on July 8, but there was a decrease of 1,949 in the number of surplus stock cars which brought the total on July 14 to 5,702 cars.

The reported shortage in freight cars on July 14 totaled only 5,574. This was an actual decrease since July 7 of 1,314 cars despite the record loading of revenue freight. Shortage in box cars on July 14 was only 1,047, a decrease of 214 within a week, while the shortage in coal cars were 2,700, a decrease of 1,167 within the same period.

Ford Automobile Plant for Philadelphia

Construction of a new assembling plant by the Ford Motor Co., in Philadelphia, appeared to be assured this week. Engineering representatives of the company came from Detroit to look over a 70-acre tract of land at 63rd St. and the Schuylkill River, on which the company has an option at a purchase price reported to be about $6,000 an acre.

The proposed new plant would replace the existing assembling facilities at Broad St. and Lehigh Ave. Increased output is said to have rendered this property inadequate, and limited space at that site makes expansion impossible.

The contemplated plant in Philadelphia is understood to be a part of the Ford company's program for building in various parts of the East on which several million dollars will be spent.

Big Rail Consolidation Planned for Midwest

A consolidation of the Chesapeake & Ohio R.R. with the recently combined Nickel Plate System, is the next railroad move contemplated by the Van Sweringen interests of Cleveland, it was reported. Such a consolidation, provided it were approved by the Interstate Commerce Commission, would give the Cleveland financiers a unified system of more than 4,000 miles, touching such important centers as Chicago, Cleveland, Detroit, Cincinnati and Toledo.

Representatives of the Cleveland interests are now in practical control of the two lines, so that all that would be required would be a plan for a consolidation, it is said, and the permission of the Interstate Commerce Commission.

Would Combine Civic Societies

Plans are being discussed by the leading trade and civic organizations of Baltimore, Md., for the consolidation of all these bodies for the purpose of bringing about greater commercial and industrial growth of the city. The Board of Trade, the Merchants and Manufacturers' Association, and the Export and Import Board of Trade are included. At the same time there is a general feeling on the part of those interested that no matter what is done, steps should be taken to extend the work done by the Industrial Bureau of the Board of Trade. This bureau has been responsible for bringing numerous industries to Baltimore and its work has been decidedly effective ever since it was organized.

Australia Buying Many Motor Cars

Australia is today as it has been in the past, America's leading export market for motor cars, says Trade Commissioner J. W. Sanger in a report to the Department of Commerce. It imported from the United States in 1922, $23,000,000 worth of automobiles and parts and is now buying about 60 per cent of its motor chassis, bodies, equipment and spare parts from the United States. Aside from this, its imports of chassis from the Canadian factories of American manufacturers represent approximately 20 per cent of its total purchases. Roughly speaking, one out of every three makes of American cars are represented in Australia, in one way or another.

American cars usually rank in popularity in about the same order as they do in the United States. The leading eight American cars in this market represent upward of 40 per cent of Australia's total purchases of motor vehicles of all kinds from all sources.

Why They Like American Cars

At the present time with the pound sterling at $4.60, American motor cars with American motors or American built bodies, sell for slightly less than double their American price. Broadly speaking, the features of American cars that recommend them strongly to the Australian buyer and which have enabled them to so completely outdistance the English, Italian, and French cars, are high power, clearance and strong springing, and the many refinements and conveniences included in the equipment of moderate priced cars.

The distributor's chief difficulty today, is not the delay in receiving shipments from overseas, so much as obtaining the locally built bodies for the imported chassis. Very few cars selling in the class of $1,000 or under, f.o.b. American factory, are imported complete, but only as stripped chassis, the bodies being built in Australia. In the $1,500 class a larger number of cars are imported from the United States complete. Despite the fact that a considerable industry of body building has been built up in the Commonwealth, it is yet unable to meet the increasing demand. Recently efforts to get twelve motor bus bodies built in Victoria were met with a direct refusal, makers stating that they were too busy to take further orders, and New South Wales builders on being approached would only agree to fulfill half of the order. Many distributors, impatient of this delay, have been importing a much larger number of bodies than previously.

Will Hold Convention in Chicago

The eleventh annual convention of the Supply Association of the American Railway Tool Foreman's Association will be held Aug. 29, 30 and 31 at the Hotel Sherman, Chicago, Ill., according to an announcement that has been sent out by Herbert S. White, secretary and treasurer of the association. Due to the fact that no convention was held during the past two years, a delay in the announcement was occasioned, and due also to the same reason, it is expected that the attendance this year will be greater than ever before in the history of the association.

Milwaukee Factories Are Well Employed

Midsummer characteristics govern current machinery business and prospective customers are slow to act upon responses to their inquiries. These, too, are light, but it is significant that they are running heavier than a year ago, which builds up stronger hopes that Fall trade will be active. In the local trade, developments since the beginning of June have been gratifying and justify the expectancy of continued good business.

Manufacturers of machine tools are operating at about the same capacity as the average for the year, with orders on the books which insure a continuance of this rate until early Fall. Complaint is still heard concerning a shortage of competent workmen, although this is not quite so serious a problem as in shops of users of machine tools. The average manufacturer of machinery has been employing considerably more capacity than the makers of metalworking tools and naturally any shortage of labor is felt more seriously.

Oil Field Activity

The Southwestern petroleum area is showing another burst of activity in demand for all descriptions of oil-well equipment and some current machine tool business is traceable directly to the increased production needs of manufacturers of drilling and pumping units. In the coal mining industry activity is spotty, with a single notable contract for machinery reported, this calling for the largest mine-hoist unit ever projected, and to be built by the Nordberg Mfg. Co. of Milwaukee, with electrical equipment by the Westinghouse interests.

Automobile manufacturers are again in the market for tools, although inquiry and orders are confined to a few major producers, who as yet are not doing much beyond replacing worn out or obsolete machines and apparently are not striving to bring about any material increase in capacity. Public garage and repair shop construction is proceeding and furnishes dealers with opportunities to reduce their supplies of the lighter class of floor equipment as well as making the used machinery market fairly active.

Manufacturers of saw mill and woodworking machinery are busy, although new business is running into the customary slack season, from which a revival is expected as Fall enters. Building construction is falling off markedly, limiting prospective lumber manufacturing operations, but automobile body builders are pressing for equipment. A large Wisconsin woodworking machinery interest, namely the D. J. Murray Mfg. Co. of Wausau, Wis., has decided to become an active factor in seeking export business and has recently established for the first time a foreign sales department.

Good Sales Consummated in Pittsburgh

The surcease of business in the iron and steel industry is now being felt by the makers and dealers in machine tools and machinery in Pittsburgh. Apparently the Summer quietness is on in full in all lines. In this respect dealers say they are no worse off than last year at this time when exactly the same conditions were encountered in the machinery equipment business. However, several deals that have been hanging fire for two or three weeks were closed in the past few days, among them the awarding of a contract for twelve or fifteen machine tools by the Pittsburgh Board of Education, while the Westinghouse Electric & Manufacturing Co. has placed additional orders for machinery for the new plant at Sharon, Pa. Makers are awaiting with interest the decision of the Pennsylvania R.R. with regard to its list of machine tools for Columbus, Ohio.

Inquiry among the dealers here shows that numerous sales have been made in the past week, one being that of a 20-in. shaper to a local user and a fair number of small tools such as floor grinding machines, drilling machines, and hacksaws.

Inquiries continue to come in for single installations. It has been noticed that buyers are particular in having their specifications lived up to without the slightest deviation, even in the case of used machinery, as well as in new orders.

From the South there came an order for a wheel turning lathe, and the same interest was this week inspecting a bed lathe.

One feature of the sales market this week was that of a horizontal post milling, drilling and boring machine that had been used. It was shipped in two cars to a Central Ohio user, and weighed 52,000 pounds. There is very little activity in the crane market, only one sale having been noted last week, but there were several inquiries that may lead to business in the near future.

New York Market Still Satisfactory

Improvement in sales and inquiries has been noted in the New York district during the past week and dealers report that this condition is surprising considering the time of the year and what was to be expected in the line of business in July and August. Railroads are still good customers and seem to be ordering with more promptitude following their inquiries than has been the custom in the past. Inquiries are also coming in from the roads with regularity and prospects for a good Fall business from this source are anticipated.

Textile mills in New England are buying continually but in small lots, according to New York dealers. It was to be expected from the record of past years that the textile people would be out of the market by now but this is not the case.

Automotive industries around New York have taken the lull in their own production as an opportunity to overhaul and replace their machines and this has added considerably to the market activity. From all indications the automotive business will be lively in the Fall and preparations are being made to see that machines are in the best of condition before that time.

Heavy machinery is moving slowly, merchants in this line state. Used machinery is not as active as it was in the Spring, but compares favorably with the business done last Summer.

Exporters say that there has been a slight improvement in shipments during the past month and that it is anticipated that this will continue for the remainder of the shipping season.

Machine Tool Business Good in the South

A survey of conditions in the Southeast shows the metal trades industries of the district entering the second half of the year in the best condition in three years, and with a majority of the foundries and shops operating near capacity, according to William E. Dunn, Jr., secretary of the Southern Metal Trades Association in Atlanta.

Pig iron production in the Alabama district continues on a stable basis, with the prices still holding around $27 though a downward tendency is noted in some districts. Other plants melting iron in the Southeast also are in full operation.

Export trade out of Southeastern ports in iron and steel products has mounted steadily since the first of the year and in this regard the industry will enjoy one of its best years in the South.

Improvement Shown in St. Louis Business

There has been some improvement in the machine tool situation in St. Louis during the past two weeks, although business has not picked up to the extent hoped for. Inquiry has been much more heavy than for the past two months. The railroads have been showing considerably more interest in the market and indicate that they will buy for their pressing needs. Shops are nearly all running on full schedule.

The vacation season to some degree has retarded new orders and has hurt collections for the reason that responsible officers of firms are out of the city and apparently there is no one vested with the authority to make purchases and disbursements.

After being idle for a number of years, the Granite Mountain mine, at Iron Mountain, Mo., is to be re-opened for the production of ore, in fact it is already producing a few tons per day. If the mine comes up to expectations, St. Louis manufacturers will be able to purchase ore cheaper than heretofore. Some manufacturers in this district have been using ore from the Northern fields and others from the mines of Alabama.

The automotive industry is slackening up a bit, although the production of passenger cars is quite as good as it has been for the past two months, though not so great as early in the Spring.

Long Island R. R. Receives Many New Cars

Thirty-five of the ninety-two new steel passenger cars ordered by the Long Island Railroad for delivery this year have been received and put into service. Twenty of the cars have been assigned to the steam service and fifteen of the trailer type to the electric service. The cars assigned to the electrified divisions were distributed so as to provide two additional cars on four different trains and one extra car on seven other trains operating over the Rockaway Beach and Far Rackaway branches.

Of the fifty-seven cars yet to be delivered, forty will be equipped with motors, five will be trailers, ten will be for steam service and two will be mail cars.

Buffalo Preparing for Fall Business

Conditions in the Buffalo market have followed the usual trend for July, which is ordinarily a light month on account of vacation periods and other Summer drawbacks. Foundry and machine shop operations throughout the district are lighter than at any other time this year. Small machine shops especially find business quiet and operators of both small and large shops find it necessary to solicit business.

Factories making parts used by the automobile industry in the West, especially screw machine products, are facing new conditions. The manufacturers who furnish their principal markets are not buying nearly so heavily as earlier in the year and many of them are asking for reductions in prices quoted which the local manufacturers say they cannot possibly meet on account of the present condition of the labor market in Buffalo.

Regarding the labor outlook, it may be said that there is an evident tendency on the part of many large Buffalo plants to reduce their forces somewhat at this time. There are no indications at the present of a downward tendency of wages and yet the fact that several of the city's largest plants are reducing the size of the payroll by letting a few men go in this department or that may be the forerunner of such a condition. Of course, this is the season of the year when manufacturers usually tighten the lines just a bit to allow for Summer slack and get things shipshape for Fall business.

Some Factories Very Busy

On the other hand, there are a few large industries which cannot seem to catch up in production, generally because the capacity of the plants is not sufficient to take care of the business now on the books. But these are mainly plants that build up their stock during the Summer months and have their slack season later. One such company reports that various conditions have tended to hold back production this year and one of its Buffalo plants is 86,000 pieces behind at the present moment.

While sales of heavy machinery for public work, railroads, oil refinery and the like have let down, companies manufacturing such equipment report that they are experiencing a good business on lighter lines, such as ventilating fans. The tendency in large public building projects seems to be to hold off as long as possible, anticipating price reductions in the Fall. Inasmuch as the prices for machinery are so largely based on steel prices, it cannot be said that there are any present indications of lower prices for Fall.

One feature of the market for machinery for construction work is that equipment which ordinarily does not sell very heavily at any time seems to be moving well now while movement of standard equipment, such as hoisting engines, concrete mixers, wheelbarrows, cranes, steam shovels and the like is very backward. However, the reason for the latter situation is apparent. Last year in western New York there were probably twenty-five large construction jobs getting under way as against four or five at the present moment. At least one dealer in equipment of this kind, however, reported that his business for July this year would total at least 100 per cent better than for the same month last year.

Demand for lathes, milling machines and other equipment of this kind is spotty, and concentrated mostly on the smaller sizes. There is a fairly good and continuous demand for small tools, such as taps, reamers, drills and dies, although the quantities which are being sold are smaller right now than under normal conditions.

Collections Are Being Closely Watched

Another important indication of present tendencies is the fact that collections are steadily getting slower, even with the most responsible firms. Probably 75 per cent of the plant owners of the Niagara frontier are sailing as close as possible, either through over-caution because of the storm warnings which have been hoisted by banks and financial advisers, or because of an actual lessening of demand and curtailment of funds. As one machine seller put it, this is a good time to scrutinize charge accounts very closely and not to buy in larger quantities than necessary for business in sight. Unfortunately this tendency on the part of the distributors of machinery is bound to have an adverse effect on the entire business but it undeniably is the position that many are taking.

A few of the distributors in the Buffalo territory take an optimistic view for the future. One of these said he did not feel that his business was any lighter than should normally be expected at this time of the year and he looked for Fall to bring a brisk demand, although perhaps not for heavier types. However, Buffalo is not an especially good market for heavy machinery. Everything depends, this observer said, on whether or not the majority of manufacturers of the district can find enough business in the next couple of months to keep them going until the annual Fall rush of business starts in.

Willys Shares Bought in Buffalo Court

Federal Judge Knox in Buffalo accepted a bid of $3,500,000 for 739.866 shares of Willys-Overland Corp. common stock, with a clause which protects 600 holders of the first preferred stock. Judge Knox's action was taken at the resumption of the hearing in the suit in equity receivership of the Willys Holding Corp. of Toledo.

The bid of $3,500,000 was presented by Thomas H. Tracy, and was an increase of $500,000 over the bid offered by the same interests previously, on which Judge Knox had reserved decision.

John N. Willys, head of the company, expressed satisfaction with Judge Knox's decision on the bid, according to a company official in Buffalo. It offers, he said, certain advantages to 6,000 Willys Holding Corp. stockholders, who hold Willys-Overland stock valued at $15,000,000. The Tracy interests offered to stand responsible for the liabilities of the Willys Holding Corp. up to $500,000, it is said.

Railroads Authorized to Buy Equipment

The Reading R.R. has been authorized by the Interstate Commerce Commission to assume the obligation of the issuance of $6,000,000 in equipment certificates to be expended in the purchase of new locomotives and cars. The new equipment includes: 25 locomotives at $38,192 each; 500 70-ton steel hopper coal cars at $2,072.45 each; 500 70-ton steel hopper coal cars at $2,135.37 each; 500 60-ton steel hopper coal cars at $2,067.82 each; and 500 70-ton steel hopper coal cars at $2,075.58 each.

The Unadilla Valley Railway Co. has been authorized to issue notes to cover, among other things, a coal storage and locomotive fuel station at New Berlin at which engines are to be loaded by gravity, and ten 50-ton hopper coal cars to cost $2,500 each.

The Interstate Commerce Commission has authorized the Chicago & Northwestern Railway Co. to assume obligation for $4,755,000 of equipment certificates, to be applied on the purchase of the following property: forty Mikado-type freight locomotives at $45,395.06 each; ten Pacific-type passenger locomotives at $43,200 each; 140 milk express cars at $5,804.93 each; 800 50-ton steel ore cars at $1,673.70; 800 50-ton steel underframe gondola cars at $1,919.41 each; 200 50-ton steel underframe flat cars at $1,581.10 each; and 40 10,000-gallon steel tankers at $2,550 each.

The New York, Chicago & St. Louis Railroad Co. has been authorized by the Interstate Commerce Commission to assume liability for $4,275,000 worth of equipment trust certificates to apply on the purchase of the following equipment: 30 light Mikado-type locomotives at $64,000 each; six Pacific-type locomotives at $48,380 each; 1,000 55-ton steel underframe, composite copper cars at $2,010 each; and 500 55-ton steel underframe, composite gondola cars at $2,250 each.

New Haven Will Electrify New York Division

A contract for $1,250,000 was signed recently between the New York, New Haven & Hartford R.R. and the Westinghouse Electric & Manufacturing Co. for the immediate delivery of twelve heavy passenger electric locomotives.

Clinton L. Bardo, general manager of the New York, New Haven & Hartford R.R., said that seven of the locomotives have already been shipped to the yards of the railroad at New Haven, Conn., and that the remaining five will be delivered within three months. He said that in supplying the road with the additional locomotives, the company is further extending its plan to electrify the entire road.

The locomotives will be used on the New York division and the plan is to eliminate entirely the use of steam passenger locomotives on that division. As yet there are no definite plans to extend the electrification of the road to Hartford or Springfield, but with the New York division fully equipped to handle its passenger traffic with electric locomotives, arrangements will be instituted looking toward the electrification of the entire system, although it is not anticipated that this can be done in the immediate future.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

By THEODORE H. PRICE
Editor, *Commerce and Finance*, New York

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THE ONLY sensational happenings of last week were in Germany. There was a riot with some fatalities in Frankfort and a run on the Reichbank at Berlin.

They were both due to the swindle of which the German wage earners are the victims through the depreciation of the paper mark. More than 25 trillion marks had been issued up to July 14 and they have become practically worthless outside of Germany, although they are still being foisted upon the German people in exchange for their labor and goods. They are, however, being rapidly displaced by other currencies. Some German industrial and commercial concerns are printing their own obligations which pass as money, and the American paper dollar is circulating freely although its use as a medium of exchange is nominally unlawful.

But the chaotic conditions in Germany have had no influence upon the American markets, except as they encourage the hope that France will soon see the futility of trying to make a debtor pay by choking her to death. This hope of a Franco-Anglo German agreement is somewhat quickened by cables from London and Paris which seem to indicate that by his gentle firmness and persistence the British Premier is gradually convincing France that her present position is untenable.

An American can never be sure of his way in following the tortuous paths of European diplomacy, but some of the bankers whose advices were alarming a month ago are now quite optimistic in the belief that the foreign crisis which threatened has been averted.

Here in America conditions might be described as static. The stock market has been quiet with a firm undertone, and bonds are tending upward as the undigested issues are being assimilated. The indications are for higher prices when the harvest season is over and the city vacations are ended.

Railroad earnings are excellent. The autumn traffic promises to be enormous. The surplus oil production is being taken care of and the only fly in the ointment is the price of wheat, which continues to fluctuate around a dollar and is, to tell the truth, remarkably steady when the wide advertisement given to the prospective surplus is considered.

But, as against the unsatisfactory price of wheat, there is to be noted the advancing market for corn, which has sold at 87 cents in Chicago. Oats and rye are also higher, and as the wheat crop represents less than a fourth of our grain production, it may be that in the gross the farmers' returns will be less discouraging than it is the fashion to assume.

Discussing this phase of the matter the *Breeder's Gazette* points out that less than 7 per cent of the value of farm crops and live stock last year were represented by the American wheat crop, and it argues that it is only among the one-crop farmers who specialize in wheat that the much talked of decline will cause distress. It declares with truth that "America can never be made safe for the one-crop farmer" and adds that "If the map of agriculture is red or revolutionary in spots in this country, those spots owe their color to the demonstrable unsoundness of the one-crop system."

It concludes that, "So long as mixed farming, with its foundation based upon improved live stock, continues to increase, as it has been rapidly increasing in recent years, American agriculture cannot be 'ruined' by unprofitable prices for wheat."

"The only sensational happenings of last week were in Germany. Here in America conditions might be described as static. Viewing the domestic situation as a whole the salient features are small stocks, a steady consumptive demand for all necessary staples and a feeling of caution among distributors and manufacturers, who still fear that an acceleration of business may be in some way checked by the powers who control the supply of credit, and who are determined to prevent the inflation."

New crop cotton had a sudden drop when it rained in Texas and the premium on July delivery evaporated; but there was a prompt though partial recovery and if the crop turns out as large as some expect, 20 cents a pound will not be an unprofitable price for it.

Sugar, coffee, and the minor commodities have not changed much; but the distant coffee options are well bought whenever they are under 7 cents, at which figure they seem cheap.

There is talk of a rubber shortage in the remote future, and the supply available at or around 27 to 28 cents is being absorbed.

Copper is firm at 14¾ cents but its future depends on Europe.

The steel industry is fully employed, but is no longer abnormally pushed as it was last winter.

In the market for textile fabrics the Spring opening of the American Woolen Co. was the event of the week. Prices averaged about 12 per cent above those of six months ago, and although the sales were large the buying is said to have been deliberate.

In the cotton goods market buyers are waiting for raw cotton to find its level and some more New England mills have gone on short time. But retail sales continue ahead of last year and every one agrees that stocks are small and must be soon replenished.

The market for silk fabrics is also waiting for a stabilization of the raw material, which is somewhat lower. If any one outside of Japan knows what silk is going to do, he will not tell.

Hides and leather are two other commodities which puzzle even the wisest, but an overproduction of leather seems indubitably indicated by the continued sluggishness of the market for it.

Viewing the situation as a whole the salient features are small stocks, a steady consumptive demand for all necessary staples and a feeling of caution among distributors and manufacturers, who still fear that an acceleration of business may be in some way checked by the powers who control the supply of credit, and who are determined to prevent the inflation of which they are so apprehensive.

The result is that most business men are running at a moderate speed. They fear to go faster, as they know that a sudden application of the brakes might damage the train; but it may be that they will soon find themselves behind the customary schedule and that they will be compelled to make better time or be passed by their competitors because they do not have the goods their customers demand.

Domestic conditions are certainly sounder than usual. Of course there are some things that need correction. There always are. But upon the whole the country is in better shape than for many years at this season, and with an abundance of credit and of work for those who want to work, there is no visible reason why we should not have prosperity.

The weekly statement of the Federal Reserve System shows a gain of $14,000,000 in gold. The reserve ratio has risen to 78.2 per cent. This compares with 76.5 per cent for the previous week and assures an abundant supply of credit during the harvest season. The statement is not otherwise significant.

Machinery Tonnage Shows Big Total

Machinery, boilers and castings contributed 1,356,696 tons to the revenue freight carried by the Class 1 railroads during the first quarter of 1923, figures just compiled by the Interstate Commerce Commission show. Of that tonnage, 1,027,549 tons originated in the Eastern District; 9,168 tons in the Pocohontas region; 61,269 tons in the Southern region, 258,710 tons in the Western District.

News of Washington Activities

By Paul Wooton

IF newspaper editorials reflect the opinion of the public, the Coal Commission's report has the approval of the vast majority of the people. The comments favorable to the report greatly exceed the criticisms. It is particularly noticeable that a larger number of these editorials approve what the Commission has recommended and would go even further in the effort to insure a constant supply of coal. It is not only the newspaper that is elated over the election of Magnus Johnson that advocates doing what the Commission recommends and much more, but vigorous editorials to that end have appeared in the conservative papers of the country—publications which are outspoken against the radical tendencies which have flared up in the middle West.

The returns from the clipping services indicate that an unusual amount of newspaper space has been given to this report and to editorials commenting upon it. With few exceptions, they accept the Commission's belief that the mining and the distribution of anthracite are matters which effect the public interest in a legal way and that there is an obligation on the part of mine operators and mine workers to give continuous service.

Some few papers characterize the whole report as unfair and as constituting a dangerous precedent in its proposals which require publicity of accounts and otherwise allow the Federal arm to be thrust into private business. Some editorials take the ground that the Commission has recommended nothing which is likely to be put into effect and as a consequence has wasted $600,000 of public money.

Opinion is very much divided as to whether the President should be empowered to take over the operation of mines during an emergency. The opinion is expressed that the Federal Government would be no more successful in inducing the men to return to work than would be their regular employers. Nearly all editorial writers who touched on that point show skepticism as to the ability of the Government to secure anything like a normal production.

Some of the editorials reflect opposition to the compulsory divulgence of so-called business secrets. Some of the newspapers, not unfriendly to the plan, doubt its feasibility because of the legal difficulties involved in attempting to establish Federal control over mines or even to force publicity of accounts.

In that connection attention was called to the fact that the Supreme Court of Indiana, in passing upon the Fuel Commission law of that state, held that the state has no authority to fix conditions of mining and to set prices on coal since the commodity is likely to be carried in interstate commerce. At about the same time a court in the District of Columbia ruled that the Federal Trade Commission has no right to demand production costs because mining is not an interstate commerce.

In accordance with the plan already announced, the Commission has begun the issuance of some of the material on which its anthracite report was based. The first exhibit is the study of earnings of anthracite miners made by Miss Anne Bezanson. Other exhibits will be forthcoming at frequent intervals in the future.

Nothing to justify the abrupt dismissal of A. P. Davis from his position as director of the Reclamation Service has developed since the Secretary of the Interior took that action. Such justification as has been proffered by Secretary Work and by his assistants seems to have been refuted as the facts became available.

One of the reasons put forward for the summary character of Mr. Davis' dismissal was that the situation of the water users is so desperate as to make necessary drastic action. That the farmers on the reclamation projects are in any such plight as that described at Secretary Work's office, seems to be contradicted by the Secretary of Agriculture who is authority for the statement that "the financial distress among farmers on these projects is no greater than the financial distress of farmers not on reclamation projects throughout the region from the Missouri River west. In that region there are large sections in which I have no doubt agricultural distress is greater than on the reclamation projects."

As the situation is being analyzed more thoroughly, those who are looking into the matter are more convinced than ever that the motive behind the change was an endeavor to secure a partisan political advantage. During the entire time Mr. Davis was at the head of the Reclamation Service, he did all in his power to prevent attempts to dilute the reclamation fund. He feels that there are too many projects as it is, and that successes must be made of those before attempting to take on more. This policy aroused bitter complaint from those who are anxious to have Uncle Sam undertake further development. There is reason to believe that no small part of the influence which resulted in the ousting of Mr. Davis came from those who are anxious to interest the Federal Government in the Columbia Basin project. To this, however, must be added the influence of those who wanted to see Mr. Davis removed from the path along which their various schemes must advance, to say nothing of those concerned with existing projects who would repudiate obligations.

Comparative Prices of Shop Supplies

Average of New York, Chicago and Cleveland Prices

	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb	$0.0337	$0.034	$0.0276
Cold finished shafting	per lb	0.0428	0.042	0.0355
Brass rods	per lb	0.1825	0.1850	0.1650
Solder (½ and ½)	per lb	0.276	0.2862	0.21
Cotton waste	per lb	0.1231	0.1231	0.101
Washers, cast iron (½ in.)	per 100 lb.	4.66	4.66	3.83
Emery, disks, cloth, No. 1, 6 in. dia	per 100	3.08	3.08	3.11
Lard cutting oil	per gal	0.575	0.608	0.575
Machine oil	per gal	0.349	0.349	0.36
Belting, leather, medium	off list	37%	42½%	46¾%
Machine bolts up to 1x30 in.	off list	44¼%	44¼%	53¼%

A. E. S. C. Will Consider Electrical Code

The American Engineering Standards Committee announces the appointment by its Chairman, A. W. Whitney, of a committee to arrange for a thoroughly representative conference to decide whether there shall be formulated, under the auspices and procedure of the A.E.S.C., a combined electrical fire and safety code. The committee will also make a careful study of the general situation with respect to such a code and will outline and propose some form of policy for the consideration of the conference. At present, two separate codes are in force: a "National Electrical Code," which prescribes methods of wiring, fixture, and machine installation with respect to fire hazard; and a "National Electrical Safety Code," that deals primarily with the personal hazards. Since both provide guides for materials and methods of electrical construction, it is clear that either co-ordination or combination of the codes is a desideratum. Which method is best suited to the circumstances of the case is the question now under consideration by the committee.

The proposed formal conference to consider the formulation of the code, will not be called until some time after October, 1923. The members of the committee arranging for the conference are:

David Van Schaack, Aetna Life Insurance Co.; Cyril Ainsworth, Pennsylvania Department of Labor & Industry; F. O. Evertz, Ohio Inspection Bureau; F. M. Feiker, Society for Electrical Development; H. W. Forster, Independent Bureau; and S. J. Williams, National Safety Council.

Turkey Signs Contract for U. S. Machinery

A contract to supply agricultural machinery and to introduce modern agricultural developments in Turkey has been signed by the Turkish government and the Ottoman-American Development Co., owner of the "Chester Concessions," the company announced.

The contract is for six years and is guaranteed by the Turkish government, which insures a minimum annual sale of agricultural implements to Turkish subjects of 400,000 Turkish pounds, about $1,760,000 at normal exchange rates.

Under the contract, there are to be established repair shops, machinery depots and schools of instruction for farmers who, it was explained, are now using wooden plows. One of the instruction shops will be established on a railway car which will travel through the rural districts.

Personals

A. B. DAY and W. E. EVANS, of Knoxville, Tenn., have organized the Day-Evans Iron Works, and plan the establishment of what is said will be the largest plant in the South devoted to the manufacture of mining machinery and equipment.

CAPTAIN F. J. JUDD, well known in the iron and steel industries in the Southern field, has been appointed general superintendent of the plant of the Florida Machine & Engineering Co., Tampa, Fla., according to an announcement made by H. A. Van Borrsum, general manager of the company. Captain Judd has for some time been connected with the Gulf Iron Works in a similar capacity.

G. A. TRUBE, for many years with the Westinghouse Electric & Manufacturing Co. in Europe, and also with the Equitable Trust Co. in Paris, sailed on July 24 on the S. S. *France* for Neuilly, France, where he will have charge of the construction work at the new American hospital.

ALEXANDER I. MCKAY has been appointed superintendent of the Morgan Manufacturing Co., Keene, N. H.

A. H. CANDEE has joined the Gleason Works organization in Rochester, N. Y.

PROF. HAROLD A. THOMAS, for the past 13 years a member of the staff at Rose Polytechnic Institute, Terre Haute, Ind., has been appointed to the faculty at Carnegie Institute of Technology for next year. He will begin his new work in the Fall as professor of Theoretical Hydraulics and of Hydraulic and Sanitary Engineering.

FRED O. HEUSER, founder and president of the Unity Manufacturing Co., Chicago, has resigned and will become associated with the Fort Dearborn Manufacturing Co., as Chicago representative.

LAURENCE CORNELIUS, general manager of the Wolverine Brass Works, Grand Rapids, Mich., has been made secretary of the firm.

Urges Industry to Employ War Veterans

An appeal to business organizations to assist in absorbing into industry the three or four thousand disabled war veterans who are completing government training courses monthly, was made recently by the Chamber of Commerce of the United States. The National Chamber calls attention to the obligation that rests on the business interests of the country to co-operate with the government to the end that all of the men be given employment.

"The men who are being trained," says the National Chamber "are trained in many lines and are prepared to meet adequately the physical and mental demands that their new occupations will place upon them. The government can only rehabilitate and train the men up to the point of employability. From this point the employing interests of the country must carry on."

Most of the reports that have come to the central office of the Veterans Bureau in Washington from the employers of the country who have had these men in their employ give favorable reaction as to the satisfactory service of the rehabilitated men.

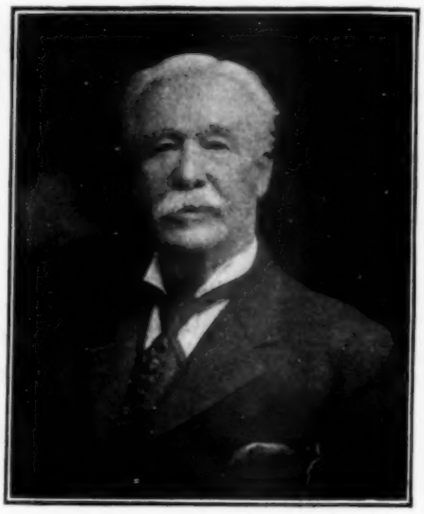
More than 30,000 of the men have been rehabilitated and have gone into employment within the last two years.

Statistics show that they are earning more in their new vocations than they earned before the war.

Salmon W. Putnam Claimed By Death

Salmon W. Putnam, aged 79 years, died recently at his home, Fitchburg, Mass. Mr. Putnam was the founder of the Putnam Machine Works, at Fitchburg which is now operated by Manning, Maxwell & Moore, Inc., and during his lifetime was the inventor of many valuable improvements on lathes and other machine tools.

Mr. Putnam was the first to devise means of placing leadscrews on the front of lathes, thereby adding to the convenience of operation. He also invented the self-aligning spindle boxes for lathe spindles and the same principle has since been applied on grinding machines. Another of Mr. Putnam's achievements was the non-conflicting feed mechanism on lathe aprons, whereby the engagement of shear nuts and the leadscrew automatically disengages the rack pinion.



SALMON W. PUTNAM

He was generally accredited as being the oldest machine tool man in the country and his death will be mourned by machine men in all parts of the United States.

Obituary

ORIN V. BRANSON, for several years chief engineer of the Atlanta, Ga., branch of the Grinnell Co., Inc., died at his home in Atlanta, recently, at the age of 49 years, following an illness of several months. Mr. Branson had been connected with the Grinnell Co. for about 20 years.

WALTER L. MINGLEDORFF, for many years one of the owners of the plant of the Forest City Machine Co., Savannah, Ga., died recently at his Savannah home at the age of 60 years, following a protracted illness.

Business Items

Private bids for all of the property of the Mitchell Motors Co., in bankruptcy, Racine, Wis., will be received for 30 days from July 23 by Herbert F. Johnson of Racine, trustee, according to the agreement adopted by creditors at a meeting held that day to receive the report of the appraisers. The trustee was instructed not to consider any bids except in bulk. In case no satisfactory private bid is received within the specified period, a public auction will be held, at which piecemeal as well as bulk bids would be entertained. The minimum bulk figure regarded as satisfactory is $1,500,000. The report of the appraisers filed July 23 gives the value of all assets at $1,819,851.87, of which amount $1,013,110.34 represents real estate and buildings; $419,659.18, machinery; and $387,082.35, miscellaneous property. It does not include cash on hand of $145,038 in charge of the trustee, the result of sales of finished automobiles and materials.

The Great Lakes Boat Building Corp., Milwaukee, has increased its authorized capital stock from $200,000 to $750,000, directly as the result of making a contract with the Packard Motor Car Co., Detroit, for the manufacture of a standardized motor yacht which is to be marketed through the Packard dealer organnization. The contract will require substantial additions to the plant and equipment of the Great Lakes company, details of which have not been divulged, however. William C. Morehead is president and general manager. It is stated that the motor yacht will be powered with a regulation Packard 12-cylinder motor and will be trademarked the Great Lakes-Packard motorboat runabout.

Seamless tubing will be manufactured by a new Wisconsin corporation, styled the Seamless Tube Co. of Wisconsin, with headquarters in Appleton, Wis. The incorporators are Math. Rossmeissl, A. G. Brusewitz and William Geenen, who represented a syndicate which some time ago bid in the property of the Reliance Motor Truck Co., bankrupt, Appleton, and will now convert the greater part of the factory into a seamless tube shop. The new concern is capitalized at $400,000, it is reported.

The Collins Engineering Co. of Conshohocken, Pa., near Philadelphia, is to be reorganized with a capitalization of $100,000. William S. Campbell, cashier of the People's National Bank of West Conshohocken, is to be the treasurer of the concern.

The various Southeastern railroads passing through Atlanta, Ga., are preparing to spend close to $100,000,000 for expansion and improvement of service during the coming year, several hundred thousand dollars of this including construction, additions and improvements to their shops in various sections, according to a survey recently by the Atlanta Chamber of Commerce. The Louisville & Nashville line heads the list, planning an investment of approximately $47,000,000, it is reported.

A. L. Reifsnider, cylinder grinding, has moved from 1,416 Madison Ave., to 1.120 Guilford Ave., Baltimore.

William Gaertner & Co. manufacturers of scientific instruments, at 5445-49 Lake Park Ave., Chicago, have just commenced building an up-to-date factory and office building, which will occupy the Southwest corner of Wrightwood and Racine Aves.

The big plant of the Louisville Sheet Steel Co., at Louisville, Ohio, idle four years, has been purchased by the Hydro Forge Co., of Alliance, Ohio. The new company will take possession immediately and will install complete new machinery for making forgings and black galvanized sheets.

What is considered the largest piping contract to be let in recent years has been given by the Carnegie Steel Co. to B. Floersheim & Co., of Pittsburgh, Pa., for furnishing and erecting complete piping installations for its works at Clairton, Pa. The contract includes furnishing and erecting of materials for steam, exhaust, water, air and gas, from the smallest size up to 66-in. Shipments will begin immediately, and will take about a year to complete.

Established during the last year of the Civil War, the Mameron & Berkley Co., of Tampa, Fla., distributors in Southeastern territory of machinery, supplies and machine tools, observed in July the 58th anniversary of the company's organization. At the time it was originally established this was one of the only companies of its kind in the South. It now operates four plants at Tampa, Jacksonville, Miami and Charleston, S. C. The company was incorporated in 1887, and since that time has been under the same management.

The Florida Steel & Wire Co. was organized and incorporated at Jacksonville, Fla., recently with a capital of $225,000, and will engage in the general manufacture of wire and steel and iron products, according to an announcement by W. A. Evans, president of the company. Other officers are: Thomas H. Evans and John G. Palmer, vice-presidents; and E. I. Carefoot, secretary and treasurer.

The offices of R. S. Stokvis & Sons have been moved from 1727 Whitehall Building, New York City, to 2843 Whitehall Building.

Sale of the foundry and machine shops of the Oliver Rim Co., manufacturers of automobile rims in Atlanta, Ga., has been ordered by the Federal Court in that city, the sale having been made to a syndicate of Atlanta business men headed by W. Woods White, who is named president of the new company. The purchase price was $85,000. Josiah T. Rose, who, for many years, has been prominently identified with the iron and steel industries in Atlanta, is associated with the new company, which will continue operation of the Atlanta plant. The Oliver concern went into bankruptcy some months ago.

The W. J. Murdock Co., Cincinnati, has moved from 116 Opera Pl. to 123 West Pearl Street.

The Connecticut Blower Corp., Hartford, Conn., has been incorporated under the laws of the state of Delaware with a capitalization of $250,000. The concern has taken over the International Blower Co. and the Hartford Sheet Metal Works. The officers of the corporation are: M. E. Keeney, president; C. H. Keeney, treasurer; and C. E. Keeney, secretary.

The Vanadium Alloys Steel Co., will move its Pittsburgh sales office Sept. 1 from First and Ross Sts. to the Oliver Building.

The Motch & Merryweather Machinery Co. are occupying new offices on the seventh floor of the Penton Building, Cleveland, Ohio.

The Brenner-Moxley-Mervis Co. has been organized in Chicago for the purpose of producing copper rods and drawn copper wire for power transmission. The company is capitalized at $600,000 and will build a factory on the south side of Chicago.

The Circular Tool Co. has been incorporated under the laws of Rhode Island for the purpose of manufacturing machinery. The incorporators are Walter B. Hopkins, George F. Hopkins and L. J. Hopkins.

George A. Coolcough of the American Chain Co., Bridgeport, Conn., sailed recently on a business trip to England. Mr. Coolcough expects to visit the continent and Africa after his visit to England.

An order for twenty-five large size pumps has been received by the Hill Pump Works of the Mid-West Engine Co., Anderson, Ind., from the Sinclair Oil Co. The Anderson-made pumps will be used in the new Sinclair refineries which are to be built in Texas and Pennsylvania.

The contracts and other papers necessary to the removal of the Columbus Machine Works from Columbus, Ind., to Crothersville, Ind., have been signed and the work of transferring the plant will start at once. The concern was founded about thirty years ago.

A five-year lease on the ground floor of the building at 227 East South St., Indianapolis, which formerly was used by the Prest-O-Lite Co., has been taken by the American High Speed Chain Co., and the company will move from Illinois and South Sts., to the building as soon as remodeling is completed.

Pamphlets Received

The Moline Plan. The Moline Plow Co., Moline, Ill. Eighteen arguments on agricultural implement selling are discussed from the dealer's standpoint in this pamphlet. The main idea is to show dealers that in spite of the low margin of profit on crops and the high level of factory wages, there is a profit in selling plows if the right methods are pursued.

Training Course for Oxy-Acetylene Welders. The American Welding Society, 33 West 39th St., New York City. This is the report of the committee on the training of welding operators of the American Bureau of Welding and was prepared under the joint auspices of the Federal Board of Vocation, the National Research Council and the American Welding Society. Following a short introduction, the subjects of qualifications for welders and fundamentals in gas welding are taken up and discussed.

Union Scale of Wages and Hours of Labor. Bureau of Labor Statistics, Government Printing Office, Washington, D. C. The union scale of wages and hours of labor as of May, 1923, have been summarized by the Bureau of Labor Statistics of the Department of Labor. Every branch of labor is tabulated with rate per hour, hours per day and a comparison with the year previous.

Safety Code for the Protection of Industrial Workers in Foundries. Bureau of Labor Statistics. Government Printing Office, Washington, D. C. Sponsored by the National Founders' Association and the American Foundrymen's Association, the Bureau of Labor Statistics has published this code. It is most comprehensive and thorough in its treatment of the subject.

Freight Claim Prevention. American Railway Association, Freight Claim Division, Chicago, Ill. By a series of sixty-eight exhibits, the causes and the remedies for freight claims are shown. The pamphlet is the report of the committee on freight claim prevention to the thirty-second annual session that was held in Montreal, Quebec, on May 29 of this year.

Commodities in Foreign Trade. The Chamber of Commerce of the United States, Washington, D. C. This pamphlet is a collection of speeches made at the eleventh annual meeting of the Chamber of Commerce of the United States in the Foreign Commerce Group Session held in New York City in May.

Part-Time Co-Operative Industrial Education. The Bureau of Vocational Training, Harrisburg, Pa. The plan of study and the methods of instruction are outlined in Bulletin No. 1 that has been issued by the Department of Public Instruction, of the Commonwealth of Pennsylvania at Harrisburg, Pa. The bulletin further tells what progress has been made and the most feasible manner of establishing similar schools. A limited number of copies are available.

Vocational Training. The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. The purpose of the course, as outlined in the booklet, is to make its students skilled mechanics, not only so they can do their own work, but so they can impart to others the knowledge of their skill. To be eligible the boy must be not less than sixteen years of age, and have a common school education. On the completion of the course, the student is presented with a tool chest, a set of tools, and $100, together with his diploma, in consideration of faithful service.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

Portable forges. Australia. Agency. Reference No. 7269.

Mining machinery, mining cars and crushers. Antofogasta, Chile. Exclusive agency. Reference No. 7251.

Pneumatic tools. Australia. Agency. Reference No. 7269.

Wood bending machine. Leon, Nicaragua. Purchase. Reference No. 7278.

Woodworking machinery. Hongkong, China. Agency. Reference No. 7234.

Technical inventions. Zurich, Switzerland. Purchase and agency. Reference No. 7276.

Engineering tools. Melbourne, Australia. Purchase. Reference No. 7241.

Forthcoming Meetings

The Supply Association of the American Railway Tool Foreman's Association. Hotel Sherman, Chicago, Ill., Aug. 29, 30 and 31. Eleventh annual convention Herbert S. White, Cleveland Twist Drill Co., 9 North Jefferson St., Chicago, Ill., secretary and treasurer.

New Haven Branch of the American Society of Mechanical Engineers. Third annual machine tool exhibit Sept. 18, 19, 20 and 21. Mason Laboratory, New Haven, Conn. A. C. Jewett, chairman.

Association of Iron and Steel Electrical Engineers. Iron and steel exposition, Buffalo, Sept. 24 to 28. John F. Kelly, secretary, Association of Iron & Steel Electrical Engineers, 708 Empire Building, Pittsburgh, Pa.

American Society for Steel Treating. Annual convention at Pittsburgh in connection with the International Steel Exposition, Oct. 8, 9, 10, 11 and 12. W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio, national secretary.

Society of Automotive Engineers. Production meeting at Cleveland, Ohio, Oct. 25 and 26. Headquarters, 29 West 39th St., New York City.

American Management Association. October 29, 30, and 31 Hotel Astor, New York City.

The Weekly Price Guide

RISE AND FALL OF THE MARKET

Iron and Steel.—Low prices of pig iron attracting inquiries. Revival in buying expected to develop at any time. Steel buying on the increase, particularly in plates. Oil-storage tank, car materials and track accessories requirements taking bulk of current business. Price of plates and shapes firm at $2.50 per 100 lb., Pittsburgh, for shipments at convenience of mill; as high as $2.60, however, obtained for small lots or where immediate deliveries are required. Structural inquiries better but confined to small tonnages.

Advances.—Copper, electrolytic, advanced ¼c. per lb. during week. Tin rose ¼c. and lead 7/16c. per lb. in New York. Lead inquiries for large tonnages, feature of the market; visible supply scarce. Zinc went up 10c. per 100 lb. in New York and East St. Louis. Antimony advanced sharply in New York.

Declines.—Raw linseed oil (5 bbl. lots) $1.05, f.o.b. New York, against $1.08 per gal., one week ago. Linseed, lard oil and lubricants markets weak. Furnace and foundry coke down 25c. per net ton in week.

IRON AND STEEL

PIG IRON — Per gross ton — Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$29.05
Northern Basic	29.27
Southern Ohio No. 2	29.27
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	34.25
BIRMINGHAM	
No. 2 Foundry	25.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	28.76
Virginia No. 2	32.17
Basic	27.76
Grey Forge	27.26
CHICAGO	
No. 2 Foundry local	29.1x
No. 2 Foundry, Southern (silicon 2.25@2.75)	30.51
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	27.77
Basic	26.77
Bessemer	28.77

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	6.75
Cleveland	6.75@7.40
Cincinnati	7.50
New York	5.50@7.00
Chicago	5.00@5.50

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	3.00	4.59	3.75	4.15
No. 12	3.10	4.64	3.80	4.20
No. 14	3.20	4.69	3.85	4.25
No. 16	3.40	4.79	3.95	4.35
Black				
Nos. 17 and 21.	3.70	4.95	4.45	5.05
Nos. 22 and 24.	3.75	5.00	4.50	5.05
Nos. 25 and 26.	3.80	5.05	4.55	5.10
No. 28	3.85	5.15	4.65	5.20

Galvanized	Pittsburgh	New York	Cleveland	Chicago
Nos. 10 and 11.	4.00	5.15	4.70	5.35
Nos. 12 and 14.	4.10	5.25	4.80	5.45
Nos. 17 and 21.	4.40	5.55	5.10	5.75
Nos. 22 and 24.	4.55	5.70	5.25	5.90
No. 26	4.70	5.85	5.50	6.05
No. 28	5.00	6.15	5.80	6.35

WROUGHT PIPE (Welded)—The following mill discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
	BUTT WELD				
1 to 3	62	50½	⅜ to 1½	30	13
	LAP WELD				
2	55	43½	2	23	7
2½ to 6	59	47½	2½ to 4	26	11
7 and 8	56	43½	4½ to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			
	BUTT WELD, EXTRA STRONG, PLAIN ENDS				
1 to 1½	60	49½	⅜ to 1½	30	14
2 and 3	61	50½			
	LAP WELD, EXTRA STRONG, PLAIN ENDS				
2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 and 8	52	39½	7 and 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	48%	34%	55½%	43½%	50%	37%
2½ to 6 in. steel lap welded	44%	30%	53½%	40½%	47%	34%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 15%. Cast iron, standard sizes, 17½% off.

SEAMLESS STEEL TUBING—Following base discounts are on 20 gauge or .035-in., round, cold-drawn tubing, ¼-in. to 1-in., O.D., weighing 0.17 lb. to 0.36 lb. per ft. Cutting charge per 100 cuts, $1.50 to $1.58:

O.D. Inches	List Price per ft.	Differential Discount	O.D. Inches	List Price per ft.	Differential Discount
¼	$0.09	50%	⅝	$0.16	35%
⅜	.11	45%	1	.18	31%
½	.14	40%			

NOTE—The discounts are to be lowered by the following differentials in the case of regular .10-.20 carbon: 25,000 ft. or over, 83; 15,000 to 25,000 ft., 82; 5,000 to 15,000 ft., 81; 1,000 to 5,000 ft., 80; less than 1,000 ft., 79.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	5.00	6.00	4.50
Spring steel (light) (base)	7.00	6.00	6.00
Coppered Bessemer rods (base)	7.50	8.00	6.55
Hoop steel	5.19	4.66	4.55
Cold rolled strip steel	7.50	8.25	7.25
Floor plates	5.80	5.66	5.80
Cold finished shafting or screw	4.40	3.90	4.55
Cold finished flats, squares	4.90	4.40	5.05
Structural shapes (base)	3.64	3.46	3.40
Soft steel bars (base)	3.54	3.36	3.20
Soft steel bar shapes (base)	3.54	3.36	3.20
Soft steel bands (base)	4.39	3.61	3.95
Tank plates (base)	3.64	3.46	3.30
Bar iron (3.25 at mill)	3.54	3.36	3.20
Carbon tool steel	11.00	....	....
Drill rod (from list)	55%	40@55%	50%

Electric welding wire, New York, 5/32, 8½c.; ⅛, 7.85c.; 5/32 to ¼, 7.35c. per lb.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York			15.37½
Tin, 5-ton lots, New York			39.50
Lead (up to carlots), St. Louis	6.40	New York	6.87½
Zinc (up to carlots), St. Louis	6.25	New York	6.70

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminum, 98 to 99% ingots, 1-15 ton lots	26.20	27.00	28.00
Antimony (Chinese), ton spot	8.12½	9.50	8.25
Copper sheets, base	24.50	23.50	23.00
Copper wire (l.c.l.)	17.25	20.75	16.25
Copper bars (l.c.l.)	22.00	24.00	19.50
Copper tubing (l.c.l.)	27.00	29.00	23.00
Brass sheets (l.c.l.)	19.75	29.25	18.75
Brass tubing (l.c.l.)	25.50	29.25	20.50
Brass rods (l. c. l.)	18.00	29.00	15.75
Brass wire (l. c. l.)	20.25	23.75	.....
Zinc sheets (casks)	10.25	10.10	.....
Solder (½ and ½), (caselots)	29.50	27.75	20.00
Babbitt metal (83% tin)	52.00	48.00	40.00
Babbitt metal (35% tin)	25.00	17.00	16.00
Nickel (ingot and shot)	29.00	.....	35 00
Nickel (electrolytic)	32.00	.....	35 00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel sheet (base)	57.00
Hot rolled rods, Grade "A" (base)	55.00
Cold drawn rods, Grade "A" (base)	63.00
Copper nickel ingots	37.00
Hot rolled copper nickel rods (base)	45.00
Manganese nickel hot rolled rods "E"—low manganese (base)	57.00
Manganese nickel hot rolled rods "D"—high manganese (base)	60.00

Base price of monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	40.00
Blocks	32.00	Cold drawn rods (base)	48 00
Ingots	38.00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	12.00	12.00	12 50
Copper, heavy, and wire	11.50	11.50	11.50
Copper, light, and bottoms	10.00	9.50	10.50
Lead, heavy	5.00	5.00	5 00
Lead, tea	4.00	4.00	3.75
Brass, heavy, yellow	7.50	....	7.50
Brass, heavy, red	9.50	9.50	9.50
Brass, light	6.00	5.00	6 50
No. 1 yellow brass turnings	7.00	6.00	7.00
Zinc	3.75	3.00	3.75

TIN PLATES—American Charcoal—Bright—Per box.

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 20x28, 112 sheets	$23.50	$19.50	$18.50
"A" Grade:			
IC, 20x28, 112 sheets	21.00	17.00	17.00
Coke Plates—Primes, 20x28 in.			
100-lb., 112 sheets	14.00	12.60	14.50
Terne Plates—Small lots, 8-lb. Coating			
IC, 14x20	8.25	6.55	7 40

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$ 0.10@0.13	$0.15	$0.11
Cotton waste, colored, per lb.	.08@.13	.12	.08
Wiping cloths, 13½x13½, per lb.	10.75@11.00	36.00 per M	.10
Wiping cloths, 13½x20 ½, per lb.	....	52.00 per M	.13
Sal soda, per 100 lb.	1.65	2.25	2.65
Roll sulphur, per 100 lb	3.85	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	1.05	1.22	1.28
White lead, dry or in oil	100 lb. kegs.	New York, 14.00	
Red lead, dry	100 lb. kegs.	New York, 14.00	
Red lead, in oil	100 lb. kegs.	New York, 15.50	
Fire clay, per 100 lb. bag		.65	.60
Coke, prompt furnace, Connellsville	per net ton	$4.50@5 00	
Coke, prompt foundry, Connellsville	per net ton	5.50@6.00	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	30%	50-10%	45-5%
1½ and 1½x3 in. up to 12 in.	15%	50%	50%
With cold punched hex. nuts up to 1 in. diam. (plus std. extra of 10%)	15%	$3.50 net	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	20%	3.50 net	$4.00 off
Burton head bolts, with hex. nuts	List net	List net	.....
Hex. head and hex. nut bolts	List net	.....	65 5%
Lag screws, coach screws	30%	.....	60-5%
Square and hex. head cap screws	60%	70%	70-10%
Carriage bolts, up to 1 in. x 30 in.	25%	45%	40-5%
Bolt ends, with hot pressed nuts	30%	.....	55%
Tap bolts, hex. head, list plus	35%	.....	.....
Semi-finished nuts, ⅜ and smaller	60%	.....	...
Semi-finished nuts, ⅞ and larger	55%	65–10%	80%
Case-hardened nuts	40%	.....	.....
Washers, cast iron, ½ in., per 100 lb. (net)	$6.50	$4.00	$3.50
Washers, cast iron, ⅜ in., per 100 lb. (net)	5.50	4.00	3 50
Washers, round plate, per 100 lb. Off list	1.50	4.00	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	List net	2.75	2.50
Nuts, hot pressed, hex., per 100 lb. Off list	List net	2.75	2.50
Nuts, cold punched, sq., per 100 lb. Off list	List net	2.75	2.50
Nuts, cold punched, hex., per 100 lb. Off list	List net	2.75	2.50
Rivets:			
Rivets, ⅞ in. dia. and smaller	40%	50–10%	60%
Rivets, tinned	40%	50–10%	4½c. net
Button heads ⅜-in., ⅝-in., 1x2 in. to 5 in., per 100 lb (net)	$5.50	$3.90	$3.75
Cone heads, ditto (net)	5.60	4.00	3.85
1½ to 1¾-in. long, all diameters, *EXTRA* per 100 lb.	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb. *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$3.70 base

Lard cutting oil (50 gal. bbl.) per gal.	$0.55	$0.50	$0.67½
Machine lubricant, medium-bodied (50 gal. bbl.), per gal.	0.297	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 2c. per sq.in., per ply:			
Medium grade	30–10%	30–10%	30–10%
Heavy grade	20–5–2½	30%	20–5–2½%
Rubber and duck:			
First grade	50–10–5%	50–10%	40-10%
Second grade	60–10%	60–5%	60–5%
Abrasive materials—In sheets 9x11 in.,			
No. 1 grade, per ream of 480 sheets:			
Flint paper	$6.30	$5.84	$6.48
Emery paper	9.90	11.00	8.80
Emery cloth	31.12	31.12	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll.	4.73	4.28	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100:			
Paper	1.49	1.24	1 40
Cloth	3.38	2.67	3.20

New and Enlarged Shops

Machine Tools Wanted

D. C., Wash.—Maculson Co., Inc., 2103 14th St., N. W. (auto repair)—lathe for metal work, gear cutting machine, shafting, pulleys and belting.

Fla., Jacksonville—H. W. Dexter, P. O. Box 665, Bisbee Bldg.—boring mill capable of boring 33 in. carwheels, 24 in. shaper, 26 in. or 30 in. upright drill press.

Fla., Orlando—Cohoon Bros. Co. (machine shop)—power metal lathe.

Ill., Chicago — Clinton Mchy. Co., 128 South Clinton St.—one No. 6 B. G. punch press.

Ill., Chicago—Illinois Central R.R., 135 East 11th Pl.—42 in. drill press.

Kan., Arkansas City—W. F. McEwen, 312 North E St. (cabinet maker) — power sander, power drill press, wood lathe, belting, emery wheel and stand.

Kan., Arkansas City—Mansfield & Sons, 117 East Central St. (blacksmith and machine shop)—power drill press, metal lathe, belting, shafting, emery stand and pulleys.

Kan., Buhler—Janzen & Reffel (garage)—power drill press.

Kan., Buhler — Martins Motor Co. (garage)—power metal lathe.

Kan., Lyons—J. A. Anderson—tinners brake.

Kan., Lyons—C. & S. Auto Supply Co. (garage)—power metal lathe.

Kan., Lyons—Hoffman & Danah Motor Co. (garage)—power metal lathe (used).

Kan., Lyons—Lyons Hardware Co.—all-metal tinners brake.

Kan., Lyons—Moline Implement Co., W. J. Myers, Purch. Agt.—power metal lathe (used).

Kan., Lyons — R. D. Moore (garage) — power metal lathe, boring machine, burning-on machine for automobiles.

Kan., Lyons — Weld-it-All Shop, A. I. Roberts, Purch. Agt.—power emery stand and wheel, and drill press for power equipment.

Kan., Lyons—Winters Oil Co. (garage)—drill press and power metal lathe.

Kan., Lyons—Young-Townter (garage)—power metal lathe.

Kan., Winfield—Irwin Bros. (blacksmith and machine shop)—power metal drill press, power metal lathe, 11 in. (used preferred).

Mass., Boston—Boston Gear Wks., 256 Franklin St.—metal working machinery for proposed factory addition at Norfolk Downs.

Mass., Boston—P. K. Lindsay & Co., 384 Atlantic Ave. (manufacturer of air compressors)—bench type engine lathe, about 9 in. swing, ¾ in. diam. spindle hole, lateral and cross feed, compound rest.

Mass., Fitchburg—H. Foster, 72 Fox St.—complete line of small and large machine tools for proposed $100,000 garage and machine shop, for city.

Mass., Worcester—R. H. Long Motor Co., Millbrook St. (auto manufacturer)—metal working machinery, including lathes, planers, drills, shapers, milling machines, pulleys, shafting, belting, etc.

Mass., Worcester—M. J. Whiteall and associates, Brussels St.—small bench type engine lathe, upright drill for drilling to 2 in., small tools and accessories for new machine shop.

Mich., Detroit—Bd. Educ., 1354 Bway. Ave.—electric bench grinder, 2 wheel to take up to 6 or 8 in., equipped with motor, 110 volt, 60 cycle, 3 phase, A.C., also guard for grinder.

Mich., Detroit — Precision Speedometer Co., 9 West Woodbridge St.—light machine shop equipment.

Mo., St. Louis—Excelsior Motor Supply Co., 102 North 12th St.—one lathe chuck, Universal or Independent, and machine shop tools.

N. J., Camp Alfred Vail—U. S. Quartermaster—taking bids until Aug. 15, for one current lathe and 2 drilling machines.

N. Y., Jamestown — J. N. K. Machine Corp., 108 Harrison St. (general machine and automotive repair works), E. R. Swanson, Purch. Agt.—milling machines and machine tools.

N. Y., Syracuse—Zube & Kahrs, 908 East Water St., (automobile repair shop), J. C. Kahrs, Purch. Agt.—one 18 in. lathe for general job work.

O., Columbus—D. L. Auld Co., 6th Ave. and 5th St., (manufacturing-stamping), H. M. Bellows, Purch. Agt.—2 lathes, several automatics, 2 punch presses and other equipment to enlarge shop facilities.

Pa., North Glenside (garage)—G. Klein—power metal lathe.

Tex., Galveston—U. S. Engineers Office, Trust Co. Bldg.—taking bids until Aug. 20 for 24 in. motor driven screw cutting lathe.

Tex., Godley—S. L. Hardcastle, Box 156, (mill and elevator)—power grinder.

Va., Richmond—W. B. Atkins, Meadow and Broad Sts. (auto dealers and repair shops)—drill press.

Va., Richmond—O. T. Burch, 2043 West Broad St. (autos)—lathe and drill press.

Va., Richmond—H. K. Dabney, 1831 West Broad St. (autos)—lathe and drill press.

Va., Richmond—L. A. MacMullen, 3504 Hermitage Rd., (general machine shop)—lathe, drill press, milling machine, emery wheel and reamer.

Va., Richmond—Richmond Battery Co., 1839 West Broad St. (auto repair work)—lathe.

Va., Richmond — Transportation Motor Co., 1410 West Broad St.—lathe, drill press, reamer and bench tools.

Wis., Kenosha—C. Mantkuss, Elizabeth St. and Howland Ave. (auto repairs)—drill press, 20 in., electric drill and emery grinder.

Wis., Milwaukee—Delta Mfg. Co., 853 3rd St. (manufacturer of auto accessories)—1 lathe, 6 or 8 in. bed.

Wis., Milwaukee—Everdy Auto Jack Co., 1306 Burleigh St., E. Rabe, Purch. Agt.—1 medium size grinder, 1 or more large drill presses, belting and shafting.

Wis., Milwaukee — Jim's Repair Shop, 1524 Galena St. (auto repairs)—22 in. drill press, 1 chain hoist and 1 air compressor.

Wis., Racine—Belle City Malleable Iron Co., C. A. Anderson, Mgr.—shop equipment, including forge and small tools.

Ont., Brantford — Dayton Iron Co., c/o Pratt & Letchford—complete equipment for the manufacture of castings for automobile trade.

Que., East Broughton — T. Jacques (garage)—repair equipment.

Que., Lake Megantic — A. Moirsette, Market St.—garage and auto repair equipment.

Que., Lennoxville—R. W. Oughtred, Main St.—repair equipment for auto repair shop.

Que., Maniwaki—A. Latourelle (garage)—repair equipment.

Que., Montreal — A. Leblanc & Cie, 16 Rue Notre Dame Est, A. Leblanc, Purch. Agt.—power shear to cut No. 8 zinc, 60 in. long.

Que., Montreal — G. A. Ross, 149 Christophe Colomb St.—equipment, including gasoline tank for garage and repair shop.

Que., Plessisville—E. Boulanger (garage)—repair equipment.

Que., Richmond—E. Dyson, Main St.—additional repair and garage equipment.

Que., Rock Island—J. H. Aldrich (garage)—repair equipment.

Machinery Wanted

Conn., Southington — Walker Stewart Fdry. Co., Summer St.—furnaces, blowers, ventilating and conveying systems, etc., for proposed new foundry.

Conn., Waterbury—General Baking Co., 1052 North Main St.—new ovens, shipping equipment, etc.

Colo., Ft. Collins—C. Presusch, 608 West Laurel St.—power job printing press.

Fla., Jacksonville—H. W. Dexter, Bisbee Bldg. (machinery dealer)—upright drill press from 24-30 in. swing, and 24 in. crank shaper (used).

Ill., Chicago—Inderrieden Canning Co., 336 River St.—modern canning machinery, conveyors, belting, shafting and hangers for proposed canning plant at Centuria, Wis.

Ill., Chicago—Wanner Mchy. Co., 714-716 Dearborn St., G. H. Simons, Purch. Agt.—power paper cutter.

Ind., Hobart—News—7 column newspaper folder.

Ia., Bayard—Bulletin (newspaper)—10 x 15 power job printing press.

Ia., Dubuque—The Adams Co. (machine and tin shop)—slitting shear No. 10 gauge.

Ia., Dubuque—Leader Oil Co., 3rd St.—gasoline tanks and pump for proposed filling station, at Cuba City, Wis.

Kan., Arkansas City — F. Smith, 420 North East St. (tinner)—tinners brake (used).

Kan., Lyons — Lyons Republican (job press work and newspaper), J. Laurence, Purch. Agt.—power metal saw and trimmer, also power paper cutter (used preferred).

Ky., Harrodsburg — Reliance Printers, South State St., E. Hoffer, Purch. Agt.—newspaper press, job press, belting, hangers, pulley, power paper cutter.

Mass., Boston—Tileston & Hollingsworth Co., 49 Federal St. (manufacturers of paper)—equipment for new unit on River St., Hyde Park.

Mass., Cambridge—E. J. Lamothe Co., 35 Albany St. (manufacturer of cans)—horning press (used, in first class condition).

Mass., Fitchburg—W. A. Harchy & Sons Co., Water St.—equipment for new foundry, including furnaces, forges, blowers, ventilating system and miscellaneous equipment.

Mass., Newburyport—The Town School Com., address Chairman — machinery for manual training department of new high school, including medium or small size lathe, planer, jointer, matcher, circular and band saw, tables, benches, pulleys, shafting and small tools.

Mass., South Walpole—Bird Machine Co.—machine tools (large and small), for proposed $25,000 machine shop.

Mich., Detroit—Dept. Purchases & Supplies, 700 Marquette Bldg., C. J. Finn, comr.—1 Universal milling machine for Dept. Pub. Wks.

N. Y., Jamestown—Barkay Co., Inc., 24 Institute St. (designers and founders in bronze and brass), W. Kidd, Secy.-Treas.—furnaces, lathes, polishing, plating and other foundry equipment.

N. Y., New York—Pacific Knitting Mills, 19 West 4th St. (manufacturer of knitted goods)—14 in. cylinder, 24 or 36 gauge, for Brinton sinking top knitting machine (used).

O., Columbus—Automatic Door & Gate Co., 318 East 11th Ave., F. A. Guth, Pres.—metal working machinery.

O., St. Clairsville—H. T. Nestrol, Box 176 (job printing)—power paper cutter.

Okla., Cushing—A. G. Stone—broom making machinery.

Ore., Goble—S. H. Thomas (saw mill and lumber)—Donkey engine 10 x 11 in. cylinder, drum and nigger head, with full equipment of tools and lines, wood burner, etc.

Pa., Albion—The Albion News—300 lb. gasoline metal furnace.

Pa., Beaver Springs — J. Catherman (woodworker)—4 side planer and matcher.

Pa., Berlin—L. N. Wilson (job printing)—power paper cutter.

Pa., Lock Haven—A. F. Stonch & Co., c/o V. R. Garleb, P. O. Box 87—planing mill machinery incl. one 8, 9 or 10 in. motor driven moulder, one No. 2 chain mortiser, one motor driven rip saw, one motor driven cut off saw, veneer presses and clamps, rawhide belt lacings.

Pa., Susquehanna — The Ledger (newspaper)—Mustang mailer.

Pa., West Chester—The Black Planing Mill Co., 220 North Church St., D. N. Showalter, Purch. Agt.—power dado machine and trucks.

Tenn., Athens — Athens Hosiery Mills, "Scott & Williams" Model B-5 footers, 3½ in. diameter, 200 needle, 48 gauge (used).

Tenn., Knoxville—White Oak Corp., Box 1094, H. T. Spencer, Pres.—200 ton wheel press (used).

Tex., Ft. Stockton—L. H. Dyche, Box 164—newspaper press and job printing press (used).

Tex., Ft. Worth—G. M. Adams, 214 Moore Bldg.—drilling machine.

Tex., Hereford—Chamber of Commerce—cotton gin.

Tex., Tyler—Byrne Publishing Co., P. E. Hixson, Purch. Agt.—power job printing press and perforator.

Vt., Castleton—R. R. MacRae—ice manufacturing machinery, conveyors, cold storage machinery, etc., for new plant.

Va., Crewe—Crewe Furniture Co.—full equipment of the latest and best machinery for the manufacture of kitchen furniture.

Va., Richmond — Brown Mills Printing Co., 11 Bank St.—power paper cutter and small job press.

Va., Richmond—J. G. Skelton Co., Inc., Railway & Power Bldg. (machinery dealers), J. G. Skelton, Purch. Agt.—locomotive crane, 20 ton, double drum, eight wheel, equipped with 35 or 40 ft. boom, and four 6 or 8 yd. standard gauge, 2 way dump cars.

Va., Richmond — W. F. Telshow, 2221 West Broad St. (cabinet maker)—rip saw.

Va., Winchester — Ridgewood Forest Growers Assn.—machinery for the manufacture of wood stave baskets.

Wis., Brownsville — Brownsville Canning Co., c/o P. H. McCarty—canning and conveying machinery.

Wis., Cudahy—S & S Paper Products Co., Lake Rd.—power punches to punch out milk bottle caps.

Wis., Eagle River — Bd. Educ., C. H. Adams, Clk.—laboratory and manual training equipment including planer, mortiser, woodworking tools and small tools.

Wis., Green Bay—Green Bay Sugar Co., 123 North Washington St., C. D. Hine, Mgr.—power machinery, pulp drying machines, conveyors, etc.

Wis., Green Bay—W. J. Rowley, 1148 Main St. (foundry)—cupola, melting furnace and moulding machines.

Wis., Kenosha—Kenosha Evening News, 261 Wisconsin St.—additional presses, paper cutter and proof machine for addition to printing plant.

Wis., La Crosse—Perfect Oil & Gas Co.—gasoline tanks and pumps for proposed filling station.

Wis., Madison—R. A. Rott, 908 Jenifer St.—gasoline bulk storage tanks and pumps for proposed wholesale oil station.

Wis., Madison—A. J. Sweet, 639 West Wilson St.—20 ton ice machine.

Wis., Milwaukee—Charmas Products Co., 63 7th St.—candy making machinery, including dipping, mixing, coating machines and kettles.

Every one of these items is reported by our authorized correspondents who are instructed to verify every item sent in. This free weekly service is published in the interests of the buyer and the seller, to bring them together and get machinery moving.

Everything possible is done to insure authenticity and timeliness.

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BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York.

Wis., Milwaukee—W. C. Felkner, 1183 Lincoln Ave. (garage)—1 air compressor, 180 lb. pressure, with 2 hp. motor.

Wis., Milwaukee—Jersey Ice Cream Co., 387 11th Ave.—refrigeration machinery.

Wis., Milwaukee—Milwaukee Boiled Ham Co., 901 Holton St.—belting, shafting and hangers.

Wis., Milwaukee—C. Schott, 1281 28th St.—1 chain hoist.

Wis., North Milwaukee—C. Lutz, Green Bay Rd. (carpentry and millwork)—4 in. planer and 20 to 30 in. band saw (used preferred).

Wis., Portage—E. Weinke—auto repair machinery, drill press, storage tanks, pumps and small tools.

Wis., Racine—Lakeside Malleable Casting Co., 23rd and Clark Sts.—new melting furnace, forges, etc.

Wis., Stevens Point—I. B. S. A., 1314 Clark St., (print shop)—power printing press.

Wis., West Allis—Marks Bros. Co., 7501 Summit Ave., (millwork), F. Marks, Purch. Agt.—large planer, sanding machine, 20-30 in. band saw, to replace that which was recently destroyed by fire.

N. S., Montague—Clark Gold Mines Corp., Ltd., E. S. Smith, Genl. Mgr.—mining and testing machinery (changing from steam to electric equipment).

Ont., Brampton—Gummed Paper Co., W. Hood, Mgr.—additional machinery for the manufacture of gummed paper for wrapping parcels.

Ont., Brantford—Slingsby Mfg. Co. Ltd.—additional equipment for woolen mills.

Ont., Carp.—W. Weatherby—additional equipment for blacksmith shop.

Ont., Collingwood—Postal Lock Nut Co., Ltd., F. A. Bassett, Genl. Mgr.—special equipment for new plant, for the manufacture of lock nuts and specialties.

Ont., Kingston—Fallon Bros.—granite cutting equipment.

Ont., Port Arthur—Mountain Stone Co., H. F. Hewitson, Mgr.—drills, crushers, screens, etc., for modern rock crushing plant at Mount McKay, Ft. William.

Que., Drummondville — MacDonald Wire Goods Co., Ltd.—additional equipment for the manufacture of wire and stamped kitchenware.

Que., Hereford—J. Dumoulin—additional blacksmith shop equipment.

Que., Kinnears Mills — A. Hall (blacksmith)—forge and other equipment.

Que., Lennoxville—J. O. Gorslein, Main St. (blacksmith)—equipment for blacksmith shop.

Que., Magog—O. Langlois, Victoria St. (sawmill)—additional equipment.

Que., Maniwaki—A. Roy (blacksmith)—forge and other equipment.

Que., Montreal — Argonaut Gold Mine, Ltd., 145 St. James St., address J. M. Morrisson, Genl. Supt., Dane, Ont. — mining equipment, including steel sharpeners, mine cars, drills and other equipment, for increasing capacity.

Que., Montreal—Colonial Chocolate Co., 382 Gilette St., A. Langeois, Mgr.—complete candy making machinery and equipment to replace that which was recently destroyed by fire.

Que., Montreal — Mirror Publishing Co. Ltd., c/o A. J. Goodstone, 120 St. James St.—printing and binding equipment.

Que., St. Marc des Carrieres—Gingras & Frere, Ltd.—quarring and crushing equipment.

Que., Westmount—Ingranis Limited, c/o F. B. Common, 418 Clark Ave.—complete equipment for manufacture of furnaces, stoves, ranges, etc.

Que., Woburn—J. N. Beaule—equipment for blacksmith shop.

Metal Working Shops

Calif., Los Angeles—Price Pfister Brass Mfg. Co., 2923 Humboldt St., is enlarging its shop and adding a new foundry, which will about triple its capacity.

Calif., Los Angeles—J. D. Watson is having plans prepared for the construction of a 4 story, 90 x 275 ft. garage on Figueroa St. near 15th St. Estimated cost $315,000. Milwaukee Building Co., Wright and Callendar Bldg., Archts.

Calif., Merced—The Merced High School Dist. awarded the contract for the construction of a 40 x 120 ft. machine shop and manual training buildings. Estimated cost $18,000. Noted July 5.

Calif., Oakland—Field & Lee, 3865 East 14th St., awarded the contract for the construction of a 2 story auto service building. Estimated cost $75,000.

Calif., San Francisco — J. D. Phelan, Phelan Bldg., awarded the contract for the construction of a 1 story, 222 x 312 ft. garage on Valencia and 17th Sts. Estimated cost $200,000. Noted July 19.

Calif., San Francisco—W. H. Woodfield, c/o J. H. Hjul, Engr., 1342 Mission St., awarded the contract for the construction of a 1 story machine shop and foundry on Folsom St. Estimated cost $17,000.

Conn., Glenbrook — The Norma Co. of America, Anable Ave., Long Island City, N. Y., plans the construction of a 1 story, 100 x 400 ft. ball bearing factory.

Conn., Hartford—S. S. Nelson, 20 Magnolia St., awarded the contract for the construction of a 1 story garage at 201

Church St. Estimated cost $65,000. Noted July 19.

Conn., Hartford—Progressive Mfg. Co., 52 Norwood St., Torrington, manufacturer of screws, awarded the contract for the construction of a 2 story, 60 x 100 ft. factory. Estimated cost $60,000.

Conn., Meriden — Manning & Bowman Co., Pratt St., manufacturer of nickel, silver plated and enameled ware, plans to build a factory comprising several buildings. Estimated cost $100,000. Architect not selected.

Conn., Southington — Walker Stewart Fdry. Co., Summer St., plans to build a new foundry. Estimated cost between $50,000 and $60,000.

Conn., Waterville—The Amer. Pin Co. awarded the contract for the construction of a 1 story, 40 x 120 ft. and 25 x 35 ft. factory. Estimated cost $70,000.

Ind., Whiting—The Whiting Fdry. Equip. Co. is having plans prepared for the construction of a 1 story addition to its plant. Estimated cost $40,000. L. G. Hallberg, 116 South Michigan Ave., Chicago, Engr.

Mass., Fitchburg — The city is having plans prepared for the construction of a 2 story, 50 x 150 ft. garage and machine shop. Estimated cost $100,000 or more. H. Foster, 72 Fox St., Archt.

Mass., Norfolk Downs (Boston P. O.)—Boston Gear Wks., 256 Franklin St., Boston, plans to build a 2 story, 75 x 100 ft. addition to factory, here.

Mass., Pittsfield — Nesbit Bros., 30 4th St., is having plans prepared for the construction of a 2 story, 100 x 120 ft. garage and service station. Estimated cost $50,000. G. E. Haynes, 184 North St., Archt.

Mass., South Walpole—Bird Machine Co. plans to build a 1 story, 75 x 150 ft. machine shop. Estimated cost including equipment, $25,000. Private plans.

Mass., Worcester—Amer. Steel & Wire Co., Grove St., will build a 1 story, 60 x 100 ft. annealing house. Estimated cost $40,000. Private plans.

Minn., Minneapolis—Acme Transfer & Storage Co., 524 South 4th St., plans to build a 1 story garage and 4 or 5 story warehouse on 3rd St. and 10th Ave. N. Estimated cost $125,000. J. Juster, Pres.

Mo., St. Louis — Amer. Car Co., 1518 South Vandeventer St., awarded the contract for the construction of a 1 and 2 story addition to car manufacturing plant. Estimated cost $40,000.

Mo., St. Louis — W. D. Kunkel, 3132 Washington Blvd., awarded the contract for the construction of a 1 story, 50 x 115 ft. garage on Washington St. Estimated cost $45,000.

Mo., St. Louis—N. O. Nelson Mfg. Co., 20th and Chestnut Sts., awarded the contract for the construction of a 1 story, 62 x 293 ft. plumbing supply factory on Boyle St. Estimated cost $45,000.

Mo., St. Louis—Smith Davis Mfg. Co., 20th and Locust Sts., plans to build a bed and spring factory, comprising 1 and 2 story buildings, on Kingsland St. Estimated cost $300,000 to $400,000.

O., Cleveland—I. G. Kohn, 640 Guardian Bldg., plans to build a garage and commercial building at 2027 East 105th St. Estimated cost $50,000. W. S. Ferguson Co., 1900 Euclid Ave., Archt.

R. I., Providence—S. Priest, c/o Imperial Printing & Finishing Co., Bellefont, awarded the contract for the construction of a 1 story, 190 x 300 ft. garage and service station on Elmwood Ave. Estimated cost $150,000. Noted May 24.

Wis., Madison — University Motor Co., 2201 University Ave., is receiving bids for the construction of a 2 story, 50 x 100 ft. garage and repair shop. Estimated cost $40,000. J. Fishbank, Prop. Private plans.

Wis., Portage—E. Weinke is having plans prepared for the construction of a 2 story, 50 x 70 ft. garage and repair shop. Estimated cost $40,000. R. A. Phillips, Beaver Bldg., Madison, Archt.

Wis., Racine—Belle City Malleable Iron Co., awarded the contract for the construction of a 1 story, 115 x 306 ft. foundry. C. A. Anderson, Mgr.

Wis., Racine—Lakeside Malleable Casting Co., 23rd and Clark Sts., awarded the contract for the construction of a 1 story, 40 x 120 ft. addition to foundry. Estimated cost $60,000.

Wis., Milwaukee—Jersey Ice Cream Co., 387 11th Ave., plans to build a 2 story factory on Mitchell St. Estimated cost $40,000. Architect not selected.

Ont., Oshawa — General Motors Corp. plans to build a 2 or 3 story factory on Division St. Estimated cost $200,000.

Que., Montreal—Central Garage Co., St. Denis St., awarded the contract for the construction of a 3 story garage on St. Denis St. Estimated cost $30,000.

Que., Montreal—The Harbor Comrs. will construct a 1 story, 45 x 245 ft. machine shop, on Notre Dame St. E. Estimated cost $39,000.

ADDITIONAL OPPORTUNITIES

Employment
Miscellaneous
Equipment
Business

See the

SEARCHLIGHT SECTION

This Issue, Pages 172 to 185